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Articles.

CONGENITAL INGUINAL HERNIA IN SERVICE RECRUITS

BY

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AND

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A COMPLETE and instructive summary of the subject of inguinal hernia in Service men by Edwards has been followed by papers in the succeeding year by Martin, Brandon, Beach and others. It can be presumed, therefore, that the subject is still open and that there has been no complete agreement in the treatment of this difficult condition. There is, however, a distinct measure of concurrence that the Bassini type of operation is obsolescent. We would like to contribute still further to this subject, relating our experiences in the treatment and particularly the aftercare of such cases.

In 1943 a naval establishment was set up in Bristol for the remedial training of Grade II new entries to render them fit for acceptance in the Service. Among these new entries were a number suffering from inguinal hernia, and we were able to pick a series of 96 consecutive cases on which this report is based. These cases all had a congenital type of indirect inguinal hernia with good abdominal musculature, and we decided to treat them on a similar plan and to evaluate the results after three months. The Medical Director General of the Navy was asked to have any recurrences up to two years reported to us, and instructions to this effect were issued to all Royal Naval hospitals and sick quarters (M.D.G. 49560/43).

Our plan of treatment was based on the following assumptions:—

(1) That direct inguinal hernia in youths or young adults is always due to a preformed congenital sac. Of course, this is not the case with direct inguinal hernia in the elderly, which is due to weakened inguinal muscles. It may be that some indirect inguinal herniæ in older men are also due to the muscular factor, but it is more probable that all indirect inguinal herniæ are congenital in origin.

(b) That any sac filled or partially filled [illegible] presses on the inguinal ring, thereby causing atrophy of the muscular elements of that ring. This allows further distension of the sac and a vicious circle is established.

These two assumptions lead naturally to the conclusion that treatment should consist of first, removal of the offending sac as high up as possible; secondly, and exceedingly important, re-education of the inguinal muscles. Any attempt at artificial closure of the musculo-fascial internal ring, apart from, in some cases, suture with one or two thread sutures of the medial margin of the orifice—i.e. the transversalis fascia—can do no good. It may indeed often do harm by leading to post-operative oedema and fibrosis, giving rise to interference with function and further wasting of the inguinal muscles. In the same way injury to the knee joint leads to wasting of the quadriceps. We believe therefore that all possible trauma to the tissues in the inguinal canal should be avoided, and that all dissection should be delicate and sharp, avoiding hæmorrhage and disturbance of the lie of structure to prevent bruising and oedema; gauze dissection must be avoided. Attempts to close the internal ring and to reinforce the posterior wall of the canal by bringing down the conjoined tendon behind or in front of the cord is bad surgery. Dislodgement of the cord leads to traumatic oedema and bruising, and bringing down the conjoined tendon is to be deprecated on three counts: first, the line of action of the muscle has to be altered, and it is a first principle of muscle transplantation that the transposed muscle must work in the same or very nearly the same axis as it does normally (figs. 1 and 2).

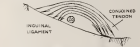

FIG. 1. Normal posterior wall of inguinal canal.

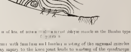

FIG. 2. Alteration of line of action of the internal oblique muscle in the Bassini type of operation.

Secondly that the muscle fibres are sutured to a fibrous tissue structure—the inguinal ligament—and union is very unlikely Thirdly the muscle or the edge of it is transfixed by four or five sutures thereby successfully preventing it from ever working again leading to its atrophy and replacement by weak and useless fibrous tissue As regards the rebuilding of the muscular elements of the inguinal canal we consider it important to get the patient up walking the day after his operation in order to use actively the inguinal muscles and also to prevent by auto-massage the onset of excessive traumatic oedema

The operation is conducted as follows —

The incision is as usual half an inch above and parallel to the inguinal ligament The external oblique aponeurosis is exposed and incised parallel to and three quarters of an inch from the inguinal ligament across the line of the fibres of the external oblique (fig 3) This incision opens the external ring and is continued inwards to open up one inch of the external spermatic fascia which it will be remembered is a continuation of the external oblique aponeurosis

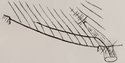

Fig 3 —Line of incision of external oblique and of external spermatic fascia

This exposes the proximal cord and cremasteric musculo fascial layer which in turn is divided for about two inches by sharp dissection The cremasteric branch of the deep epigastric artery is invariably divided and must be ligated with linen thread this is the only vessel requiring ligation from now on The sac is then exposed clearly and almost falls away from the surrounding tissues, aided where necessary by a few touches of the scalpel and not by blunt dissection If necessary a finger is introduced into the interior of the sac, which may be opened in its middle part The sac is dissected well up until extraperitoneal fat is revealed and at this point ligation is performed It will be noted that the edges of the cremasteric layer fall together naturally and that suture is not necessary The external oblique is sutured with No 40 unbleached linen thread In the majority of cases if dissection in the canal has been sharp and deliberate there will be no haemorrhage and no need for buried ligatures or sutures except for the single ligature mentioned above This we consider important as buried foreign material cannot but interfere with the normal [illegible] function of the [illegible] applied and the patient returned to bed where after recovering from the anaesthetic he is encouraged to move about freely. The following day he gets up and walks round the bed and on the second post operative day is allowed up completely. The patient is kept in hospital for ten days then examined and sent home for seven days leave to return to the rehabilitation centre in Bristol.

H.M.S. *Bristol* was an establishment specially organized for graduated remedial training and had a number of specially trained physical training instructors on the Staff. These instructors conducted classes for various deformities under medical supervision and a special class was formed for post hernia cases. On return from sick leave patients were examined, given a careful explanation of the procedure and then started on a course of graduated exercises and games with particular emphasis on avoidance of sudden strain. It is unnecessary to give long tables of exercises but all were evolved with a view to gradual improvement in abdominal and general musculature. Patients attended the ordinary routine classes which did not involve exercises (seamanship &c.) and had two periods daily of remedial exercises. Each week the form of exercises and games was changed and made more strenuous and in the third week such exercises as skipping, cycling, medicine ball, &c. were included, more strenuous games being permitted and swimming encouraged. Having shown no ill effects patients then started the normal remedial exercises and physical training classes and at the end of eight weeks training were given the same passing out tests as other trainees, these including:—

(1) Two miles run and march (17 minutes)
(2) The "fireman's lift" and carry man weight 200 yards (3 minutes)
(3) Running long jump—9 ft. and over
(4) Climbing 16 ft. rope
(5) Obstacle course which included a 9 ft. wall, 2 vaults, 2 ditches, crawl through maze and cat walk 9 ft. 6 in. high (1 minute)
(6) Ten mile route march (2 hours)
(7) 44 yards swim in duck suits (except in ratings who had not yet learned to swim)

It was found that none of the cases showed any signs of recurrence in the first three weeks. The abdominal musculature developed in a remarkable way, the patients were most enthusiastic and none would admit to any pain or discomfort. The difficulty was to prevent undue haste in progressing from one stage to the next and to stop strenuous games such as football during the earlier weeks.

Although not generally acceptable we believe very early convalescence—by which we mean being allowed up the first post operative day—to be a valuable contribution to the success of the above operation for simple congenital type hernia. If operative technique has been really careful and deliberate there is no hæmorrhage and a minimum of traumatic œdema and the muscles involved are encouraged to work from the very first rather than to remain inactive with consequent wasting for a period of one, two and sometimes even these muscles. Massage of the quadriceps is recommended [illegible] the knee joint [illegible] after operative treatment and a period of [illegible]

At the end of December 1943 it was decided not to proceed with Grade II entries and H.M.S. *Bristol* had to be handed over to our American allies. This interfered with the training of hernia cases whose operations were performed after October 1943—a total of 13 did not complete their training in Bristol.

In all, 96 consecutive cases of congenital inguinal hernia were treated, of whom only 83 completed training. 70 were 18 years old, 5 aged 19 to 29, and 8 were 30 to 34 years old. There were 2 cases of bilateral hernia and 6 with accompanying undescended testicle (4 removed, 2 brought down). There were also 3 cases of post-operative chest conditions, 2 of which cleared up within four days and 1 developed pneumonia. One case recurred in the fourth week of training. 2 cases showed some weakness of the internal ring. All other patients left the establishment medically Grade 1 approximately 10 to 12 weeks after operation, having completed all the strenuous tests and passed Part I of their seamanship course.

In the later follow-up, admittedly incomplete and difficult, we have been notified of four recurrences, one being in one of the above mentioned cases of weakness of the internal ring. These recurrences occurred in the fifth, eighth, fifteenth and twenty-fourth month after operation, and in two cases there was operative evidence that the original sac had not been completely removed.

Conclusions

These results are not particularly good, although better generally than results of large series published for all classes of hernia, as indeed they should be. Hernias should be divided into two distinct classes—distinct in age, incidence, variety, site and particularly in treatment. The first class is the indirect inguinal hernia occurring in young, healthy and muscular youths or adults under the arbitrary age of 21, and the second class includes every other type of hernia. The first presents a physiological problem, and the only duty of the surgeon is removal of the sac as described above; the rest of the treatment belongs to the physiotherapist. The second presents a mechanical problem, and here the surgeon must rely not on restitution of the normal but on his ingenuity to construct a natural or artificial barrier to further herniation. In the first class success should be almost 100 per cent, and is particularly the type met with in Service personnel.

Summary

(1) The principles of treatment of congenital inguinal hernia are enumerated.

(2) A description of a simple operative technique and after-care is described.

(3) The value of early convalescence and exercises is emphasized.

(4) The results of 83 cases are reported.

THE CARRIER RATE OF INTESTINAL INFECTIONS IN TRINCOMALEE

BY

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The prevalence of intestinal infections in Ceylon has been well recognized for many years but there appears to be no detailed information available as yet concerning the important base of Trincomalee.

The investigations described in this paper were performed with a view to ascertaining the carrier rate among European and Asiatic personnel of those infections which were found to be common causes of illness in the area.

METHOD

A total of 618 individuals were induced to submit one or more stools to the laboratory for examination. This number included 344 Asiatics (mainly cooks, stewarts and bakers) and 274 Europeans; none of these individuals had reported sick at the time of the test though a considerable number were required to do so after the results became known. As far as possible, all positive cases were physically examined and treated.

Stool examinations were performed as follows:—

(1) *Wet films*: a loopful of faeces smeared in saline or Lugol's iodine was examined microscopically for exudate, amoebae, cysts or ova.

(2) *Concentration* of cysts and ova was obtained by a modified form of the technique described by Faust (1939). A tablespoonful of faeces was emulsified in about 100 c.cm. of water and allowed to sediment. The supernatant was decanted, the sediment re-suspended in a saturated solution of copper sulphate and centrifuged at high speed for five minutes. Organic debris was thrown down as a firm precipitate while cysts, ova, yeasts and vegetable cells rose to the meniscus. A loopful of fluid was lifted from the meniscus and examined microscopically for cysts and ova.

(3) *Cultures* were made on Difco MacConkey and desoxycholate citrate media.

RESULTS

The positive findings among the Asiatic food handlers from various Service establishments are shown in Table I. Amoebic infection accounted for the highest number of positives and when physical and sigmoidoscopic examinations were performed it was found that many of the infected individuals were cases of active amoebiasis and not merely cyst passers. Of the 48 individuals who carried *E. histolytica* 30 showed evidence of active infection, 14 being in the acute phase with diarrhoea, stools containing an exudate and actively motile trophozoites of the parasite. The remainder produced mature cysts with or without a scanty exudate of leucocytes.

A number of individuals were found to carry small cysts about 7-10 μ in diameter. The morphological features of such cysts were sometimes un-

[illegible] of them were probably [illegible] *E. histolytica* [illegible] were described as "indeterminate" [illegible] the *E. histolytica* positive [illegible] *E. coli* and [illegible] in about 12 per cent of cases

TABLE I—INTESTINAL INFECTIONS IN ASI[illegible]

Establishment	No. of cases	[illegible]	[illegible]	Cysts	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C S Hospital	135	—	16	7	5	[illegible]	[illegible]	[illegible]	
R N A S	64	4	9	1	1	[illegible]	[illegible]	1	
Miscellaneous*	145	11	9	7	1	8	[illegible]	12	
Totals (No)	344	14	41	1	10	11	[illegible]	17	
Totals (%)	—	4 1	11 9	4	[illegible]	1 8	[illegible]	[illegible]	

* Dockyard, transit camp, N A A F I [illegible]

Since many of the individuals shown in Table I were [illegible] cases rather than carriers, a group of 200 apparently healthy [illegible] Asiatics was tested to gain some idea of the true carrier rate [illegible] of tests in each case ranged from two to six and concentration methods were used throughout The results are shown in Table II

TABLE II ESTIMATION OF CARRIER RATE IN HEALTHY A[illegible]

Cysts	E histolytica	19 per cent
	Indeterminate	4 per cent
	Giardia	3 5 per cent
Ova	Ankylostome	14 per cent
	Ascaris	4 5 per cent
	Trichuris	3 per cent

The carrier rate of cysts was comparable to the findings of K[illegible] (1946) in another part of Ceylon, but the figures for ova were considerably lower probably because of the fact that many of these Asiatic [illegible] workers had already been subjected to routine anti-helminthic treatment

The results of a similar series of investigations performed upon 374 male and female members of the hospital staff are shown in Table III Not less than three stools were examined from each individual and in some cases as many as 12 were examined

TABLE III—INFECTED EUROPEANS (374 INDIVIDUALS TESTED)

E histolytica (cysts)	16 (5 8 per cent)
E histolytica (veg)	nil
Indeterminate cysts	4
Giardia	4
Helminth ova	nil

Sixteen cyst-passers were picked up in this way and on examination all of these individuals showed signs of active amoebiasis though the symptoms were not sufficient to cause them to report sick at the time of the tests Two of the sick berth staff developed acute diarrhoea at the end of the period of investigation [illegible] found [illegible] of *E histolytica* [illegible] specimens.

Stool culture [illegible] performed upon all the specimens submitted [illegible] only the [illegible] or diarrhoeic specimens [illegible] bacterial [illegible]. One carrier of Sonne dysentery was identified [illegible] salmonella.

DISCUSSION

The most significant finding was the relatively high incidence of active amoebiasis among apparently healthy individuals, both European and Asiatic. Further proof of this was found in the large number of cases treated in the hospital for amoebiasis in its more advanced stages.

The carrier rate among Asiatic food handlers also seemed worthy of attention. The habits of these individuals could lead to viable cysts being transferred even to cooked food, so that infected food was probably being served every day in every Service mess in the area.

In investigations of this type the technical limitations were considerable, and it was certain that by no means all the positive cases of amoebiasis had been identified. Dobell (1916) estimated that one half to two thirds of the number of positive cases had been diagnosed in a comparable series of stool examinations. With this allowance our figures suggested that about 10 per cent of symptomless Europeans were liable to sustain amoebic infection during their stay in Ceylon, while our clinical investigations indicated that most of these would be cases of active infection. Apart from the difficulties of [illegible] diagnosis, the slow onset and mildness of the early symptoms of the disease make it seem probable that a considerable number of cases among Service personnel have returned home undiagnosed and often unaware of this liability to their health.

I [illegible] Surgeon Captain O. D. Brownfield, R.N. and Surgeon Captain [illegible] R.N. for their co-operation in this investigation, to medical officers [illegible] establishment, and to my laboratory technicians.

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SYSTOLIC MURMURS IN HEALTHY HEARTS

Based on a Study of 1,000 Naval Recruits

BY

Surgeon Lieutenant-Commander P. J. O'MEARA, R.N.

The view held in Britain to-day is that cardiac disease should never be diagnosed on the strength of a systolic murmur alone. Such a finding is an indication to the doctor that all manoeuvres must be practised which are likely to bring out other evidence of disease if such does in fact exist. For example, the patient has to be examined lying on the left side immediately after exercise, when it may be possible to distinguish the typical presystolic murmur of mitral stenosis. All this is a safe precaution, often neglected, to ensure that as far as possible nothing else is missed. In most cases the systolic bruit remains the only finding and difficulty then seems to arise. Haskin (1942) observed that the presence of a "functional" systolic murmur was a very common cause of a recruit being referred to him by a medical board for a further opinion.

Now, the average doctor must listen to almost as many hearts as does the cardiologist. Certainly he listens to as many normal ones, if not a great many more. It is strange, therefore, that so many innocent murmurs should have to be referred for a specialist's opinion. It is regrettable, too, because in some individuals the calling of so much attention to the heart may sow the seed of a future cardiac neurosis.

Medical literature abounds with papers discussing systolic murmurs, many giving guidance as to which are of significance and which are not, but few, if any, are wholly satisfactory, while many are most confusing. Few people realize how very common a systolic murmur is among healthy individuals—especially young people appearing before a medical board, when the heart beat is inclined to be more forcible than usual. It was with the aim of studying closely the features of these common murmurs as they were found in practice (together with other variations in the normal heart sounds) and in establishing "criteria of innocence" which might be applied to systolic murmurs found by others that this survey was carried out.

MATERIAL

For this investigation 1,000 healthy recruits to the Royal Navy, below 31 years of age, and examined consecutively by the writer over a period of several months, were chosen.

These young men were considered healthy on the grounds that they complained of no symptoms, showed no signs of any disease (other than skin lesions or ocular defects), and gave no history of any condition which might have damaged the cardiovascular system.

METHOD OF EXAMINATION

Each candidate was examined (*a*) standing, (*b*) lying on his back, (*c*) lying on his left side, and (*d*) lying on his left side after exercise. Only those murmurs heard in positions (*a*) and (*b*) were included in the table, as a routine examination does not usually proceed beyond this stage if no murmur or other questionable feature has been found.

THE INCIDENCE OF SYSTOLIC MURMURS AMONG 1,000 NAVAL RECRUITS

The table gives the incidence of systolic murmurs among these young men. That nearly 60 per cent. of the whole should present such a murmur may surprise some people, but it should be remembered that much depended on their examination, and their hearts were doubtless beating more forcibly than if they had been lying in a hospital ward. Furthermore, the room in which they were examined was perfectly quiet. At the same time there was never any doubt about each murmur; any "queries" were not recorded.

TABLE.—INCIDENCE OF SYSTOLIC MURMURS AMONG NAVAL CANDIDATES

Age	Number examined	No. with systolic murmurs	Percentage	No. with cardio-respiratory murmurs	Percentage	No. with other systolic murmurs	Percentage
17	295	181	61·4	41	13·9	169	57·3
18	54	33	61·1	6	11·1	29	53·7
19	198	125	63·1	42	21·2	109	55·05
20	198	126	63·1	52	26·2	101	51·01
21	52	26	50·0	12	23·1	18	34·6
22	35	19	54·3	3	8·6	18	51·4
23	40	24	60·0	7	17·5	21	52·5
24	41	22	53·7	4	9·8	22	53·7
[illegible]	87	41	47·1	16	18·4	33	37·9
Total	1,000	597	59·7	183	18·3	520	52·0

In discussing these murmurs more fully, the larger group of "others" or non-cardiorespiratory murmurs will be considered first. One observation may be made immediately, and that is that it was unusual for a systolic murmur other than one of the cardiorespiratory or exocardial type to be heard in the mitral area with the subject in the erect position.

SYSTOLIC MURMURS (NON-CARDIORESPIRATORY)

Of the 520 candidates having a systolic murmur of the non-cardiorespiratory type, 148 (28·5 per cent.) showed a murmur at the pulmonary area, 137 (26·3 per cent.) at the mitral area, and 230 (44·2 per cent.) had a murmur audible in both sites. In addition, there were 5 (0·96 per cent.) with faint murmurs in the aortic area only.

(1) *In the mitral area*.—If one takes as an example of a "blowing" murmur the diastolic murmur of aortic regurgitation, then it seems that there are few cardiac murmurs that can truly be said to possess this quality. That this is not the general view is evident from the large variety of murmurs to which the term "blowing" is applied by many authors. It is a matter of opinion, and opinions vary depending upon the preconceived notion in the mind of the clinician of what sound is to be expected from a blowing or a rough murmur as the case may be. As long as one's standard remains the same this point is of no importance when forming one's own opinion about a certain murmur; what is important is that one cannot be too dogmatic when describing the murmur to others. Exceptions of course would be such obviously blowing sounds as the diastolic murmurs of aortic regurgitation or some of the very rough murmurs of exocardial origin, where it would be difficult to find disagreement as to their quality.

With the above reservations, therefore, it seems that the systolic murmur usually heard at the mitral area in these naval candidates is best described [illegible] of medium pitch [illegible] a partly blowing and partly rough character lacking the [illegible] of a typical blowing [illegible] It sometimes began with the first sound but more often it appeared to follow it It never masked the first sound which was always clearly heard Sometimes it would approach the form of a whiff following the first sound as described by Thayer (1925) though rather a roughish whiff if one may call it so It was of all degrees of loudness sometimes very faint often fairly loud and occasionally very loud As mentioned above it was very rarely heard with the patient erect and then only faintly and with a rapid pulse As a rule the murmur was increased by turning the candidate on to the left side and also by exercise though occasionally the latter would cause it to disappear Sometimes the murmur would be heard only following the change to the left lateral position or after exercise Inspiration caused the murmur to disappear or in a few cases when it was unusually loud (as in some poorly developed chests) to grow fainter Conduction of the murmur was always poor even when quite loud at the impulse it would not be heard in the axilla which suggests that there must be something else about a murmur besides its intensity which determines its conduction Occasionally it seemed as though there was a continuity with a murmur in the pulmonary area but more often when murmurs were present in both areas there appeared to be a gap between the two, or, at all events an area in which the murmur was much less intense than at the pulmonary area and impulse Lastly such mitral murmurs were often observed to decrease in intensity or even disappear altogether during the course of the examination even though the patient remained in the same position this might happen even when at first the murmur had been quite loud In such cases it could be brought out again by turning the subject on to his left side or by exercise The point is that whether loud or faint whether constant or inconstant the quality of these murmurs was the same

Such is the description of the great majority of the mitral murmurs Occasionally however there was a variation and the murmur would be lower pitched than normal or higher pitched and more blowing At times it was definitely more of a rub and appeared closer to the stethoscope The last type was no doubt of exocardiac origin and could often be heard in the upright position

(2) *In the pulmonary area.*— A systolic murmur at the pulmonary valve area is often found It is the commonest of all heart murmurs and if it is absent with the subject in the upright position it can usually be brought out in the normal individual as well as in the cardiac patient by the assumption of the supine position especially in full expiration (White 1944) This murmur is often described as blowing (White 1944 Hoskin 1942) Among the naval candidates the murmur was found to vary from a medium pitched slightly rough slightly blowing sound resembling that described in the mitral area to a low pitched and decidedly rough one On the whole it was louder lower pitched and rougher than the mitral murmur In nearly every case this pulmonary murmur followed the first sound sometimes immediately sometimes after a short interval The first sound was always

heard clearly. As a rule the murmur, when loud, continued right through systole up to the second sound, but when fainter it would fall short of this. As remarked by White it was frequently associated with a split second sound, but since a murmur and a split second sound are both so common this was not surprising, and each was often found without the other. Like the sound in the mitral area, the pulmonary murmur, if not very loud, disappeared on inspiration. In all cases, however, forced expiration increased its intensity. This manoeuvre was not carried out as a routine in cases in which no murmur was heard and all the murmurs noted in the table were audible without its aid. However, in individuals not showing a pulmonary murmur and by whom forced expiration was performed, such a murmur would frequently become audible in both the erect and recumbent postures but more commonly in the latter. As with the mitral murmurs, these pulmonary sounds were not usually heard in the upright position without forced expiration even though they might be very loud with the subject recumbent. Indeed, it did not appear to be the intensity of the murmur in the recumbent position which determined whether it was audible with the subject upright; the pulse rate appeared to be a more important factor, most cases showing a pulmonary systolic murmur when standing having a pronounced tachycardia, though not invariably so. Even then the murmur was nearly always faint and rarely very loud. The left lateral position and exercise generally increased the intensity of these murmurs and sometimes brought out a murmur which had not been audible previously.

(3) *The conduction of pulmonary systolic murmurs.* This question raises the first of two rather interesting observations regarding innocent murmurs in the pulmonary area. First of all it may be said that conduction of these murmurs to either side in the lateral plane, however loud the murmur might be, was almost negligible, although fainter murmurs sometimes heard over the aortic area were no doubt connected; only very rarely were they conducted a very short distance towards the left shoulder. However, if the stethoscope were moved up to the left sterno-clavicular joint the murmur could frequently still be heard. It appeared to remain audible and often clearly so on listening over the vessels in the neck. This brings us to a feature which is seldom noted in textbooks.

White (1944) describes three sounds as being sometimes audible over the jugular veins, especially on the right side. He says that they coincide with the A, C and V waves of the jugular pulse, the first being due to auricular contraction and the second and third the result of transmission of the first and second heart sounds respectively. The present writer was unable to hear the auricular sound, but he was able to hear three sounds in the majority of these young men under 30 years of age, especially in the recumbent position. There was no doubt that the first and third of these corresponded to the first and second heart sounds, but the middle one was a short, rough, low-pitched murmur, in many cases resembling the systolic murmur so often found in the pulmonary area, except that it tended to be shorter and to be separated from both the first and second sound, so producing a form of systolic triple rhythm. This murmur was nearly always present when a pulmonary systolic murmur [illegible] on both sides of the neck and was often [illegible] on the right side. However [illegible] was heard in most [illegible] it may occur even when [illegible] pulmonary murmur is inaudible. Nevertheless its similar characters and [illegible] between the two sounds made it difficult to believe that the venous murmur and the pulmonary murmur were not connected. It is important also in that a medical officer when hearing an innocent systolic murmur in the aortic area, as was sometimes present in these cases, may, on discovering the sound in the neck, believe that the patient has aortic stenosis. The murmur of pulmonary stenosis is of course said to be not conducted into the neck, so the mistake of diagnosing this condition is not so likely to occur. On the other hand a clinician might perhaps discard such a diagnosis in a patient in whom the condition is present upon hearing this murmur in the neck. The fact that this murmur is usually so obviously situated between the first and second heart sounds, however, should prevent both these mistakes from occurring. It is strange that this late systolic murmur in the neck should receive such little recognition in the textbooks. Lastly, an innocent pulmonary systolic murmur when loud may commonly be conducted downwards into the third, fourth and even the fifth interspace. Its characters change, however, as it is followed downwards, when it is heard to become more high pitched and blowing.

(4) *Crepitant accompaniments of pulmonary systolic murmurs.*—The origin of the pulmonary systolic murmur is, like that of the mitral murmur, obscure. Pressure changes in the pulmonary artery have been considered as its most probable source. In other words it is generally assumed that the murmur is intracardial, or at least intra-arterial. Among these naval candidates, however, and in others not included in this series, it has been found that when loud these pulmonary murmurs often possess a superadded rough crepitant quality which seems to bring the murmurs closer to the stethoscope. In other words there seems to be an exocardial factor in the composition of the murmur in such cases.

This appears to be the most appropriate stage at which to mention the phenomenon of mediastinal crepitations. Among the 1,000 candidates they were present to a noteworthy degree in 20 (2 per cent.). In every case these crepitations were associated with the usual type of pulmonary systolic murmur which was always very easily heard. Like it, they were loudest in the second left intercostal space near the sternal border, but they could often be heard also over the sternum itself. Before exercise they were audible only in the recumbent position and then often only during inspiration. They consisted of numerous crackles which were quite loud and appeared to be just underneath the stethoscope. They were more coarse than the sounds given by hairs on the skin and some of them were more like superficial râles. Incidentally all these cases were conspicuously lacking in hair on their chests. In most cases the sound was produced by inspiration, increasing as inspiration reached its height, but they frequently bore a relation to the heart beat also. Usually systolic, they sometimes occurred in diastole and might be placed with the first [illegible] them [illegible] at the [illegible] time with each heart [illegible]

The [illegible] mediastinal crepitations is that their presence in healthy people should be realized. Only 2 of the above 20 cases gave any record of noteworthy illness in the past—both of pneumonia in childhood. Two others had, however, been X-rayed quite recently because the crepitations had led a doctor to think that something was wrong. Three others were X-rayed at the instance of the present writer. In all five the results were negative. Presumably such crepitations are as likely to be encountered in disease as in health, and thus might be mistaken in a sick person for early pericarditis. It is almost certain that they do in fact arise from pleuro-pericardial friction, presumably over the front of the heart, and that they are related to the other clicks and crepitations which may at times be heard elsewhere over the precordium.

(5) *Systolic murmurs in the aortic area.*—These were never a very notable feature. In only five candidates was an aortic non-respiratory murmur found alone, and in all it was not loud. Its characters resembled those of a quiet murmur in the pulmonary area. In other cases an aortic systolic murmur was associated with one in the pulmonary area and was always insignificant compared with the latter.

(6) *Other innocent systolic murmurs.*—Another type of systolic murmur which was heard in these candidates was one of a high-pitched, blowing and almost musical character, situated in the fourth intercostal space close to the left border of the sternum. This murmur was the only one which was quite loud with the subject in the erect position. In all cases there was also a murmur in the pulmonary or mitral area or both when the subject lay down. Often this type of murmur disappeared before the subject had assumed the recumbent position; in fact, it appeared to be the most inconstant of all systolic murmurs, sometimes disappearing in a few moments when it had been quite loud at first.

Finally, it should be pointed out that the characters of all the murmurs so far described may alter with change of position or after exercise. In no case was there a definite thrill present.

CARDIORESPIRATORY MURMURS

Cardiorespiratory murmurs were heard in 18.3 per cent. of the 1,000 naval candidates. They form a rather indeterminate group for reasons which will be explained.

(1) *The cause of cardiorespiratory murmurs.*—Potain, according to Zuelzer (1937), considered that the heart, owing to its diminishing volume during systole, causes a negative change in intrathoracic pressure especially in its immediate neighbourhood; in other words, that it exerts a systolic aspiration on the lungs, thereby producing a murmur. This theory, according to Zuelzer, has been established as a fact by experimental research. Certainly it has stood the test of time and has been repeated by various authors (Thayer, 1925; White, 1927, 1941; Lewis, 1943, and others). The result, as Thayer (1925) describes it, is a rhythmical accentuation with each systole of the inspiratory

murmur and sometimes a slight sound during expiration also or in the words of Lewis (1943) The normal vesicular murmur being broken into two or more short murmurs by the heart beats

In an article on cog wheel respiration Herbert (1930) concluded that the common form of this type of respiration consisted of interruptions synchronous with the heart beat the latter producing air waves He found that it was a physiological phenomenon encountered in 30 per cent of all men and 53 per cent of women In other words cog wheel respiration and cardiorespiratory murmurs are essentially the same and this can easily be verified clinically by anybody who cares to listen carefully to these phenomena The phases of cog wheel respiration are synchronous with the pulse rate and are much more commonly heard on the left side of the chest than on the right Only occasionally do they appear to be so closely associated with the first heart sound as to render confusion with a true cardiac systolic murmur possible It was only in these circumstances that they were included in this series as cardiorespiratory murmurs Nevertheless cog wheel respiration was very frequently heard over the precordium quite apart from its appearance there in the guise of a systolic murmur and it is the difference of opinion which may exist as to when it should be called a cardiorespiratory murmur and when it should not that makes this group of systolic murmurs so indeterminate

(a) *The characters of cardiorespiratory murmurs* —These are too well known for much space to be taken up with them Briefly these murmurs are nearly always systolic in time short and blowing in quality and appear and then disappear as inspiration proceeds Occasionally they reappear on expiration and are usually absent when expiration is completed. They are as a rule better heard with the individual erect and may disappear when he assumes the recumbent position They may be heard over any part of the precordium but in these candidates the cardiac impulse was the commonest site

Cardiorespiratory murmurs very rarely reach the intensity possible with a non cardiorespiratory mitral murmur and never that sometimes achieved by a murmur in the pulmonary area However they are often quite loud and may be conducted to the left axilla and to the angle of the left scapula This last site is also a common situation for cog wheel respiration to be heard even in the absence of what might be called a cardiorespiratory murmur (or even ordinary cog wheel respiration) in the precordium

Cardiorespiratory murmurs are very inconstant appearing and disappearing at different stages of the examination They are particularly common with a rapid pulse when they may be difficult to distinguish from a cardiac systolic murmur

Occasionally a cardiorespiratory murmur may be diastolic in time

Exocardial or Extracardiac Systolic Sounds

These were not included under the heading of systolic murmurs in the table The unusual extracardiac quality of the common pulmonary systolic murmur has already been described as have mediastinal crepitations also Strictly speaking the cardiorespiratory murmur is also extracardiac Other systolic extracardiac sounds heard from time to time in these naval candidates took the form of rubs, clicks, crepitations, squeaks and slapping sounds. Often they were cardiorespiratory in nature, synchronizing with both the heart beat and the phases of inspiration. They were heard in either the erect or recumbent position or in the same individual. Either low-pitched or high-pitched, they often altered their characters and sites of maximum intensity when the subject changed his position or took exercise. The slapping sounds were heard down the left border of the sternum only.

CONCLUSION

The study of these recruits indicates that innocent systolic murmurs with the subject in the recumbent position are very frequently found in young men; in fact, their presence is as common as is their absence.

They may be quite loud, and those at the base of the heart may appear to be referred into the neck owing to the frequent presence of a late systolic murmur there. Loud murmurs other than those of cardiorespiratory or other exocardial origin vary in health with the subject in the recumbent position. Faint murmurs with the subject standing may be found occasionally in the pulmonary area, usually with tachycardia, but they are much more unusual in the mitral area, though their frequency here increases with age. *A systolic murmur which replaces or obscures the first sound is extremely rare and may perhaps never occur in a healthy person.* Also rare and perhaps never found is a systolic murmur that is propagated into the back, always excepting of course those of cardiorespiratory nature.

SUMMARY

A description is given of those systolic murmurs found in the mitral area during medical examination of 1,000 recruits of the Royal Navy. A similar description of those found in the pulmonary area is followed by some observations of a late systolic murmur over the vessels in the neck. Some errors in diagnosis which may arise from its common co-existence with a precordial murmur are mentioned.

The occasional association with a pulmonary systolic murmur of precordial crepitations is also described, and their possible confusion in sick people with an atypical pericardial rub or the precordial signs of mediastinal emphysema is suggested.

Brief mention is made of innocent systolic murmurs in the aortic area.

Some features of cardiorespiratory murmurs are described, and it is observed that this type of murmur represents a form of cogwheel respiration.

Various exocardial murmurs and sounds which were encountered in these recruits are briefly noted. It is concluded that systolic murmurs of the type described in this paper are extremely common in young people.

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D.D.T

BY

Surgeon Commander E J MOCKLER, R N

DICHLORO DIPHENYL TRICHLOROETHANE To give this complex organic chemical its full name has now become a household word First discovered in 1874 it was not until 1939—65 years later—that its value as an insecticide was realized when it was used in Switzerland for plant lice

Up to 1941 the main ingredients for all insecticides were pyrethrum and derris root and with the entry of Japan into the war the sources of both these plants fell largely into enemy hands A substitute was therefore urgently required and Great Britain and America began their search almost simultaneously By the autumn of 1942 the wonderful potentialities of D D T were announced Subsequent investigations and research in the last four years have but served to substantiate early claims and there is now no doubt that in this marvellous drug humanity has a weapon which opens up new vistas in the field of preventive medicine Although this is true for the world in general it is more particularly so for the East whose population has been ravaged for so many centuries by mosquito and fly borne diseases

SPEED OF ACTION OF D D T

Compared to pyrethrum D D T is slow in affecting insects The time varies according to the dosage of the application and the species concerned adult flies and mosquitoes usually die in two to four hours after exposure

PROPERTIES OF D D T

D D T is a white crystalline substance with a melting point of 107 to 108° C It is stable under most conditions and does not deteriorate when exposed to sunlight or heat that is not excessive The drug is nearly insoluble in water but moderately soluble in petroleum and vegetable oils kerosene and Diesel oil are the common solvents

D D T is supplied in many varieties solutions emulsions aerosols, powders and even in paints Two main forms are in present use —

(a) A 10 per cent dust in talc or Pyrophillite

(b) A 5 per cent solution in kerosene or Malarol

(a) D D T in dust form is specially suitable for the control of lice and other insects such as cockroaches bugs and fleas Its advantages lie in its high toxicity as a residual application the ease with which it can be used and its marked safety factor D D T dust can be most easily applied by the use of an insufflator this consisting of a metal container with a long nozzle and rubber bulb connected to the other end. The amount of powder used can be regulated simply by varying the pressure on the bulb A fine coating of the powder being blown on to the surface requiring treatment is all that is required

(b) As a result of experiment heavy oil has been found undesirable and D D T is now mixed with kerosene or Malarol (a proprietary preparation issued by the Shell Co) The advantages of the solution in oil are that it [illegible] readily to most surfaces can be spread [illegible] by [illegible] and remains effective even after [illegible] readily [illegible] varieties of sprayers a stirrup pump [illegible] a Knap[illegible] [illegible] pressure pump or even an ordinary [illegible] commonly known [illegible] Flit gun. The solution in oil is more [illegible] than the D D T dust.

Precautions. D D T is a toxic substance and as the oily solution can be absorbed through the skin care must be taken in its use. The amount of D D T used in an insecticide is however so small that all the casual user needs is to wipe off any of the oil that has spilled on the exposed surfaces of his body. Those engaged in continual spraying over long periods should take more effective precautions: protective clothing and rubber gloves should be worn and the face and eyes covered by a gas mask. D D T dust is not absorbed through the human skin and may be considered safe. In galleys and kitchens especial care is required in spite of the apparent safety of D D T and food and cooking utensils should be removed or covered while spraying is in progress. In appearance D D T resembles flour, it is quite tasteless, and should not be stored in kitchens or larders. The oily solution is inflammable and no smoking or naked lights should be permitted while spraying is in progress.

Effect on Insects

D D T has no repellent action: it kills insects both by ingestion and by contact, the latter effect being obtained by applying the insecticide directly on the insects or on surfaces where they walk or rest, so that toxic amounts are absorbed through the appendages and body surfaces. Reactions indicate injury to the nervous system: all movements become inco-ordinated and tremors and convulsions are the harbingers of death. If they show any effects whatsoever—particularly inco-ordination—they seldom if ever recover. D D T is applied to surfaces on which it is considered insects may alight because of its marked residual effect. In this respect it differs from the knock-out blows of the older forms of insecticides. D D T is a far more subtle poison and an infinitely surer one.

Destruction of mosquitoes

Adults.—This may best be carried out in the huts, houses or other buildings which act as a harbourage for these insects and the solution in oil should be used. The "Flit gun" is effective for individual use while a stirrup pump or small pressure pump is very suitable for large store houses or buildings. In indoor spraying the residual effect is the important one. The method to adopt is as follows:

Close all doors and windows: spray all furniture and permanent fittings in rooms both upper and under surfaces, paying particular attention to the windows, window sills and dark corners where mosquitoes may lurk. Surfaces should be left slightly less than dripping. The walls of the rooms should be sprayed to a height of eight feet. Ceilings and floors need not be sprayed, the latter because the D D T will be removed by walking and cleaning and the former because it is often impracticable. Mosquitoes will almost invariably land on the walls or furniture during their sojourn in a treated building.

Precautions.—(1) If the spraying is being carried out in galleys or kitchens all foodstuffs should be covered or removed.

(2) No smoking or naked lights should be employed while spraying is in progress.

(3) Spraying should be carried out once a week. Cleaning of the treated surfaces will, of course, remove the D.D.T. If this is done they will have to be resprayed.

Mosquito larvæ

The solution in oil is the method of choice and a Four Oaks Knapsack sprayer or one of a similar type may be used for the control of large areas of water. For borrow pits, wheel ruts and small pools a quart bottle is used in which a narrow pipe is passed through the cork and the liquid scattered over the water surface by wide sweeps of the operator's arms. Three quarts of this solution are considered sufficient for one acre. D.D.T. in oil is far more lethal to larvæ than is ordinary oil and only 1/30th of the amount is required, i.e. 2 quarts of D.D.T. solution will do the work of 15 gallons of oil—this is an enormous economy in time, oil and labour.

Destruction of flies

Adults.—D.D.T. is 100 per cent. fatal to flies. Either the solution in oil or the dust may be used, though the former is preferable. For indoor spraying similar methods to those adopted for the destruction of mosquitoes can be employed; the results are even more remarkable. Residual treatment of kitchens by D.D.T. results in enormous slaughter. Latrines, garbage tins, waste food and rubbish of all sorts usually found at the least frequented side of the house should also receive their share of D.D.T. The menace of fly-borne diseases so formidable in the East can now be almost completely overcome in any well regulated household.

Fly larvæ.—D.D.T. solutions in oil are toxic to fly larvæ and should be sprayed over places where breeding is taking place. Even if the larvæ hatch out the residual D.D.T. will kill the adults.

In order to get the best results from D.D.T. ordinary methods of hygiene and sanitation must be maintained. D.D.T. is not a complete cure, although it comes very close to being so.

Bed Bugs

D.D.T. is the perfect answer to this problem as old as history. All the mattresses should be piled one on top of the other. The outside of the pile is then sprayed at the top and sides with 5 per cent. solution of D.D.T. The first mattress is turned over and placed on the floor, the untreated side being upmost. This is then sprayed and the other mattresses treated similarly. The framework of the bed and springs can be sprayed lightly, particular attention being paid to the joints. Beds will remain free from bugs for six months after this treatment.

[illegible]

[illegible] washed [illegible] be lightly dusted.

D.D.T. was of [illegible] Naples [illegible] a well [illegible] regular dusting is [illegible].

[illegible]

D.D.T. is very effective [illegible] may be used. One [illegible] cubic feet. The floor and sides of the [illegible] bed and bedding lightly sprayed. If [illegible] on the floor and [illegible]

[illegible]

D.D.T. dust [illegible] resistant to it and may [illegible]

[illegible]

[illegible] into the breeding [illegible] D.D.T. [illegible] them to get [illegible]

D.D.T. [illegible] liberally [illegible] which D.D.T. [illegible]

D.D.T. [illegible]

[illegible] diseases [illegible] D.D.T. [illegible] that the [illegible] 1944 [illegible] New Guinea [illegible] In their short campaign [illegible] occurred among United States [illegible]

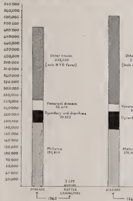
A graph [illegible] compared with battle casualties [illegible] ALFSEA (Allied Land Forces South East Asia) [illegible] 1944 is attached. The preparation [illegible]

[illegible] DISEASE AND BATTLE CASUALTIES

[illegible] 1944 & [illegible]
([illegible] Commands)

EASTERN ARMY
[illegible]
[illegible]

ALFSEA
Total strength 575,000
[illegible] disease 525,000



[illegible] on the [illegible] totally [illegible] D D T [illegible] drums but [illegible] the air [illegible] spray the area occupied by these immense bodies of men could [illegible] D D T be employed?

In May 1944 the subject was [illegible] in Australia and it was decided to investigate the possibilities of D D T sprays from the air but very little information was then available regarding the practicability of this. Some spraying had been done previously in Orlando U S A and reports of good kills of mosquitoes had been received but scientific data was scanty or absent. After preliminary trials of various aircraft available it was decided to adapt the *Beaufort* bomber for air spraying. The *Beaufort* is a twin engined machine made in Australia. The choice of aircraft was of course limited, but this machine gave at least four cardinal points—availability, manoeuvrability, good forward visibility and reliability. Three tanks were fitted to the aircraft one on each wing and one centrally; the outer tanks had a fuel capacity of 91 gallons each, the central tank 148 gallons, giving a total capacity of 330 gallons. Each tank was fitted with a valve which could be opened or closed by operating three separate levers, all of which were placed in the cockpit of the aircraft. Below the valve was a chute having a longitudinal diameter of six inches and lateral diameter of [illegible] inches and it projected about eight inches from the wings or fuselage. Each wing tank had one chute and the central tank had two.

The first experiment in Australia was carried out at Laverton aerodrome in the vicinity of Melbourne. The [illegible] used was a 5 per cent solution of D D T in equal parts of kerosene and [illegible]. Enamel plates 8½ inches in diameter were used for testing the amount of oil which reached the ground. 200 plates were used in a pattern comprising four rows of plates 40 yards apart each row 500 yards long with plates at 10 yard intervals. In all three series of experiments were carried out: first in Laverton in June and July 1944, then in Cairns in Northern Australia from August to November 1944 and thirdly in New Guinea from December 1944 to January 1945. Much detailed information was collected during this period and it was found that the following technique of airspraying when using the Beaufort Aircraft gave the best results. Air speed 130 knots (150 miles an hour), altitude 100 feet, runs to be 100 yards apart. The rate of emission of solution one gallon per second regulated by a diaphragm with a central aperture under the valve; this gives an overall spray of 2 quarts an acre. Any wind over four miles an hour interfered with the even distribution of the oil and it was recommended that spraying should be done at dawn when the wind disturbance is at its minimum and before thermal upcurrents come into play. The higher the wind the lower must the aircraft fly. As a result of personal experience the writer does not recommend a height lower than 100 feet.

The introduction of a smoke grenade which burns for two and a half minutes renders the whole air spraying operation independent of ground counted. At the [illegible] when the aircraft [illegible] side of the smoke [illegible] hopping another [illegible] up until the whole [illegible] is sprayed [illegible]. In flat country the operation is easy, but hills or high [illegible] the pilot of the aircraft needs all his skill and the [illegible] technique must be modified accordingly.

While all these experiments were being carried out in Australia similar work was proceeding in America and [illegible] methods of procedure were recommended. A [illegible] and an almost total destruction of flies was obtained in the treated area. Although well controlled and careful spraying should result in the almost complete elimination of adults and the destruction of larvae in the treated area, infiltration starts quickly if there is breeding in adjacent areas and a routine weekly air spraying is necessary to prevent this assuming harmful proportions.

Thanks to the courtesy of the Royal Australian Air Force the writer was able to carry out some air spraying in New Guinea at the Headquarters of Northern Command at Madang. The terrain consisted of scrub and swamp with high coconut trees; the huts were of the attap type with a rush roof, wooden walls, earthern floor and no windows or doors. In the evening prior to the spraying no difficulty was experienced in collecting in a few minutes 40 mosquitoes in one room of a hut; the fly population could best be described as dense. The spraying was carried out in very nearly ideal conditions although flying at 180 feet over coconut trees which varied from 60 to 80 feet high is a particularly hair raising experience. The cloud of oil descending was enough to blur the windscreen of a car and make the driver stop, and sufficiently heavy to interrupt four early and enthusiastic tennis players during their game. As a result of this spraying no flies or mosquitoes were found for the following three days and it was only subsequent to this that a slow infiltration took place. A small insect population became evident again at the end of one week.

Early in 1944 D.D.T. air spraying was almost a routine measure for every new area occupied by the advancing Allies. The Japanese in New Guinea on one occasion sent a request that their quarters might be sprayed with D.D.T. from the air, promising a safe conduct to the aircraft and crew; this commitment was not accepted. On their hedge hopping advance to Japan the U.S. Forces invariably sprayed all their island bases before the main body of their troops moved in. Peliliu Island, which was visited in June 1945, is an example of this; one of the Palau group, it is situated at the western end of the Carolines and lies at the southern extremity of the Barrier Reef. The island though flat is wooded and fertile. Peliliu had been chosen as a staging base for aircraft flying from the Admiralty Islands to the Philippines and had a native population of 8,000. The Americans had carried out routine air spraying shortly after their occupation and had apparently sterilized the island; I saw no insects during my stay there.

In 1945 the incidence of malaria, dysentery and insect borne diseases were all greatly reduced among the Allied Forces [illegible] yet been made public.

In view of the proved success of air-spraying with D.D.T. and as a result of the writer's personal experiences in New Guinea, it was decided to adapt naval aircraft for the purpose and the Royal Australian Air Force agreed to carry out the necessary modifications. The aircraft chosen was the *Vengeance*, a second line machine which was the most readily available, the carrying capacity of which was 170 gallons in the central tank and 65 in each wing tank, giving a total of 300 gallons.

These machines were first used to spray Hong Kong after the liberation which took place in the autumn of 1945. A routine similar to the Australian and American methods which had been seen in New Guinea and the Philippines respectively was adopted. Hong Kong is by no means an ideal island for air spraying, the terrain being extremely hilly. The city of Victoria and the built-up areas in its vicinity were first treated and there was an immediate and remarkable reduction in the numbers of flies and mosquitoes, the effect on the incidence of malaria being considerable. Between 24th September and 20th November, 1945, there were 1,141 cases of infectious diseases in Hong Kong, of which 855 (or 75 per cent.) were due to malaria. These figures are those notified, which were known to be far less than the actual rate of disease, for at that time the medical services were disorganized almost completely and the public health services were only just beginning to function again. The population of Hong Kong was then estimated at 750,000. In the following March the population had risen to 1,000,000, but infectious diseases had fallen to 788 cases, of which only 225 (or 33 per cent.) were due to malaria, and there were now far more opportunities for notification. The effect on flies was even more marked and the medical superintendent of the principal civil hospital stated at a meeting of the medical advisory board that, in his long experience of Hong Kong, he had never experienced such an extraordinary freedom from flies, and these remarks were endorsed by other members of the committee. In view of the favourable reports that had been received, it was decided to continue with air spraying in Hong Kong for a further period of three months, when the situation would be reviewed.

There can be no doubt that the part played by D.D.T. has been epoch-making in man's struggle against insect-borne diseases, and it proved a war-winning weapon against the Japanese. They themselves suffered a colossal death rate from preventable diseases to which their sudden and rather unaccountable collapse has been largely attributed. The importance of D.D.T. lies not so much in the fact that it prevents insect-borne diseases but in that it prevents them cheaply, effectively and easily. Whether in the future it will be sprayed from the air, applied from the ground, or superseded by an even more effective mixture, further experience will determine.

Medical science has not been idle during the war years from which we have but so recently emerged; these years, given up to so much carnage and destruction, have produced on the credit side three great medical discoveries—penicillin, atebrin and D.D.T. From the point of view of the greatest good to the greatest number, pride of place must go to D.D.T.

THE HAZARDS OF TOXIC GASES IN WARSHIPS EXCLUDING AGENTS OF CHEMICAL WARFARE

BY

Surgeon Lieutenant-Commander F. P. ELLIS, R.N.

NUMEROUS incidents have occurred during the recent world war in which men have lost their lives through the direct action of poisonous gases generated by explosions or fire, by damage to or misuse of refrigeration machinery, or fire extinguishers containing volatile chemicals, or from gases generated by internal combustion engines. Some of these accidents could not have been avoided, but in many cases the adoption of preventive measures and a general awareness of the potential hazard would not only have saved lives, but at times would have averted tragedies entirely.

The insidious nature of certain of these gaseous poisons is perhaps their most menacing feature. Nitrous fumes generated by the incomplete combustion of cordite, carbon monoxide evolved in huge volumes by the detonation of many explosives, by fires in enclosed spaces and in the exhaust gases of internal combustion engines, methyl bromide used as a refrigerant and in fire extinguishers, all these are almost devoid of odour or irritant smell, and in the presence of smoke and/or petrol vapour will often be unrecognized until too late.

The crews of warships are probably exposed to these hazards to a greater extent than are the land forces, and the dangers were probably greater in the recent war than they were in the Great War (1914-1918) because of the greatly increased use of poisonous chemicals in refrigerators and fire extinguishers, the greater numbers of shipborne aircraft and petrol driven power boats, and furthermore the importance of ensuring watertightness of ships in dangerous waters resulted in reduction of the ventilation below decks to the minimum consistent with the maintenance of reasonable efficiency. When a vessel is damaged all the ventilation to the damaged area is at once shut off to prevent the flooding of the ship through the ventilation trunking, thus gases liberated or generated by explosions cannot escape easily. Compartments are frequently crowded and it is rarely a simple matter to evacuate battened down spaces when damage occurs, even if such action is permissible, and this will rarely be the case when fires must be fought, flooding controlled or wounded assisted.

The toxic features of most of these gases are well known. Descriptions of their pathology, signs, symptoms and treatment are given in the Manual of Chemical Warfare (1944) but there is still a widespread unawareness not only amongst naval officers and ratings but also amongst medical officers of the true incidence of the dangers, the ways in which they occur, of the value of the Service respirator in prevention and rescue work, and of the death roll that has been exacted.

From a review of the literature it appears that these intoxications form a chapter in naval warfare out of all proportion to their importance in the other Services (with the exception of carbon monoxide poisoning). This is not the place to discuss clinical features which are fully described elsewhere, but it is considered important to draw attention to the considerable frequency of these incidents in wartime and to discuss their prevention rather than their cure.

NITROUS FUMES

Since the close of the last century Legge (1904), Irvine (1911) and Schröder (quoted by Wood, 1912) have reported numerous cases of nitrous fume poisoning in the British and German explosives and mining industries. In warships during the Great War (1914-1918) Simmons (1919) reported 17 cases with 8 deaths when H.M.S. *Russell* was mined in 1916 and Fauche (1920) described 36 cases with 10 deaths in H.M.S. *Britannia* following a torpedo attack in 1918, and 6 others with 3 deaths at the Battle of Jutland.

No further incidents were reported during the years of peace, but with the outbreak of war the hazard was recognized early and soon assumed formidable proportions. Desmond and Fraser (1941) described 10 cases with 3 fatalities due to the blow back into a gun turret of gaseous products of cordite combustion from the breach of a gun. Ellis (1944) described 40 cases admitted to hospitals in Alexandria following the bombing of H.M.S. *Orion* when evacuating troops from Greece in 1941. 15 of these cases died and nitrous fume poisoning was the only obvious injury sustained by 8 of the fatalities. In the United States Navy, Charleroy (1945) reported cases due to an unusual cause. Blasting gelatine, which was used for boosters in hand depth charges, caught fire and gave off thick yellowish green fumes. 8 of the 23 men affected by the fumes were seriously ill and 2 died.

Many other cases reported by medical officers have not been published. On 5th December 1940 five men in H.M.S. *Caernarvon Castle* who had been in close proximity to burning cordite charges were reported as suffering from burns and bronchopneumonia. Following the torpedoing of H.M.S. *Aurania* on 21st October 1941 four men who inhaled irritant fumes in the vicinity of the explosion developed pulmonary oedema and one died. On 13th December 1941 H.M.S. *Puckeridge* was struck by a delayed action bomb in the region of the after gun turret, which then exploded in a mess deck. It was found afterwards that the depth charge store and the four inch ammunition in No. 2 magazine were burnt out. A petty officer, who had the presence of mind to wear his gas mask, was the last man to get out of the crater alive, the man behind him falling back unconscious. Five of the survivors died of nitrous fume poisoning and 41 of the ship's company were dead or missing. On 15th May 1942 H.M.S. *Hecla* was damaged by an underwater explosion due to a mine or torpedo and 14 men diagnosed as suffering from pulmonary oedema due to "irritant gases" were probably suffering from nitrous fume poisoning. H.M.S. *Phoebe* was torpedoed on 23rd October 1942 six miles off Pointe Noire in French Equatorial Africa and 18 men died from typical pulmonary oedema following nitrous fume inhalation, while the bodies of 13 others were recovered where the cause of death might also have been attributed to this factor although blast effects and carbon monoxide probably contributed to the death roll. In discussing the treatment of these cases the medical officer commented on the paramount importance of a good supply of oxygen and efficient methods of administering it. Another incident occurred at Algiers in August 1943 when a phosphorus smoke bomb burst into flames in the forward hold of S.S. *La Montée* which also contained howitzer and mortar bombs. H.M.S. *Arrow* came alongside and shortly afterwards there were several explosions which ignited ready-use ammunition on the upper deck of the destroyer. It was reported that:—

> Most of the injured brought up copious frothy sputum and exhibited other signs and symptoms of oedema of the lung showing that they were suffering from lung lesions due to the action of phosphorus.

They were probably suffering from a mixed intoxication but of the several possibilities nitrous fumes were the most toxic although they would be less irritant than phosphorus at first.

Lastly, H.M.S. *Albatross* was holed forward by an underwater explosion on 11th August 1944 whilst lying in the anchorage of the British Assault Area off Courseulles, Normandy. The area of damage was filled with a dense grey-white smoke which spread to adjacent compartments. The medical officer, who had previous experience of nitrous fume poisoning in H.M.S. *Phoebe*, attributed most of the deaths to nitrous fume poisoning, carbon-monoxide poisoning or a combination of both. Many casualties were shocked or affected by immersion and blast but few showed signs of physical injury. 4 of the 62 injured died before the wounded were evacuated six hours after the explosion, and 18 bodies of 61 missing men were recovered a week later. Evidence of nitrous fume poisoning was not so convincing as in H.M.S. *Phoebe*. Casualties in the rescue and repair parties were less numerous and frank pulmonary oedema occurred in only a small proportion of the gassed men before they left the ship.

These are instances which can be picked out of reports ready to hand; many suspicious cases occurred elsewhere and it is certain that many others who died under similar conditions were killed by nitrous fumes.

Symptoms and Signs.—The clinical features are well described in the Manual of Chemical Warfare (1943), in the Royal Naval Medical Bulletin No. 2 and in the published accounts referred to above. The following abstract from the report of the medical officer of H.M.S. *Sirius*, who attended cases in an unidentified cruiser in company after it was torpedoed in 1944, is illustrative of a typical incident:—

"Thick yellowish fumes pervaded the atmosphere in the vicinity of the explosion. Rescue parties had [illegible] on the injured and repair parties [illegible] first. By early afternoon (the torpedo struck at 0715) several casualties (of nitrous fume poisoning) had occurred, most of whom were in the affected compartments at the time of the explosion. But from evening onwards casualties began streaming in, and of these who were not involved in the explosion area but had worked with the rescue or repair parties in the morning and carried on with their ordinary duties in the afternoon. They felt perfectly well until evening, when they developed slight tightness of the chest and an irritating cough; some also had a headache. Within a few hours [illegible] the majority were dead.

When the patients reported they appeared normal; pulse and respiratory rate only very slightly raised and auscultation revealed rhonchi throughout the chest, particularly the lower portions. The next stage, in about one hour, appeared [illegible] similar to traumatic shock: definite apathy, facies pale, pulse rapid and thready, respiration was quickened and laboured and small. The third stage was one of [illegible] in the

[illegible]

[illegible]

[illegible] phosphorus [illegible] H.M.S. [illegible]

[illegible]

[illegible]

[illegible]

[illegible] gas mask [illegible]

a period of [illegible] work. The period of full protection will depend on the concentration of gas present. Rescue and repair parties should be equipped with [illegible] breathing apparatus such as the [illegible] Davis Submerged Escape Apparatus or the Naval Breathing Apparatus. [illegible] will all give complete protection. [illegible] found frequently that the attitude of the British sailor [illegible] a hypothetical danger when there is urgent [illegible] factor of importance. It is too late to teach men about these hazards when accidents occur and thorough instruction in the possibilities should be part of the training of naval officers and ratings and [illegible] the right thing instinctively in an emergency.

CARBON MONOXIDE

The lethal effects of this gas are known to most laymen and to every medical student, yet through a neglect of the hazard casualties continue to occur. The clinical features are described in many textbooks and are summarized in the Manual of Chemical Warfare (1943).

In modern mechanized warfare carbon monoxide poisoning has caused anxiety in each of the fighting Services in turn wherever internal combustion engines have been used. In the Army, tank crews were poisoned from defective exhausts, high concentrations in the cockpits of aircraft were a menace to aircrews, and in the Navy cases occurred among the crews of motor craft of coastal forces and, later, in the hangars of aircraft carriers when engines were revving up.

Carbon Monoxide as a hazard of explosives.—Reference has already been made to the way in which varying concentrations of carbon monoxide will accompany nitrous fumes generated by underwater explosions due to mines or torpedoes. It is also evolved in very large volumes when shells and bombs are exploded or burnt. Lewes (quoted by Hill, 1914) estimated that the 400 pound charge of a 12-inch gun gave off 3,400 cubic feet of carbon monoxide when the gun was fired.

The importance of carbon monoxide poisoning in the causation of death after aerial bombing has been stressed by the Germans, and although it is not a naval communication, the recent report of the United States Strategic Bombing Survey on the Effects of Bombing on Health and Medical Care in Germany contains relevant and important facts. The Germans concluded that carbon monoxide poisoning was a major cause of death after aerial bombing and referred to typical "shelter or cellar death" occurring in rooms where the exits were blocked by rubble. So serious was the official view of the danger that the High Command of the Luftwaffe ordered a statistical survey of the incidence of carbon monoxide poisoning to be carried out. In Hamburg 70 per cent of the total casualties, excluding those due to mechanical causes or burns, were caused by carbon monoxide. According to Schoen (quoted here) 0.4 per cent carbon monoxide can cause death in one hour and death was known to occur even in the open air. Two conclusions stressed as a result of these surveys were that carbon monoxide should always be kept [illegible] casualties from aerial [illegible] and that [illegible] than [illegible] injuries. Public [illegible] possible adverse effects [illegible].

These observations [illegible] other unrecognized cases of carbon monoxide poisoning [illegible] aerial attacks on warships where, as we noted earlier, [illegible] poisoning may be found when prepared [illegible]. [illegible] but others may report cases in retrospect.

The diagnosis may be [illegible]. When H.M.S. *Birmingham* was torpedoed forward on 28th November [illegible] casualties were reported and Pattern 230 Breathing Apparatus and [illegible] equipment were said to be of inestimable value. The gas was [illegible] heavy and sweet. The carbon dioxide cool room in the [illegible] destroyed. Pyrene fire extinguishers had been used liberally [illegible] with the addition of carbon monoxide, nitrous fumes and blast [illegible] diagnostic problem. The clinical features were not typical of [illegible] poisoning. Many men were asphyxiated and many [illegible] there was no latent period followed by pulmonary oedema. 37 men [illegible] unconscious and 29 of them required artificial respiration from [illegible] first aid teams. Some cases took three hours to regain consciousness and when artificial respiration was stopped breathing frequently [illegible] and further efforts were required. Those less severely affected complained of dizziness and loss of co-ordinated locomotion and many were deeply cyanosed. Afterwards varying degrees of mental confusion were the most [illegible] symptoms.

The consensus of expert opinion when the incident was reviewed was that carbon monoxide was the principal toxic agent. [illegible] cubic feet of carbon monoxide may be evolved by 1 pound of T.N.T. and recent American experiments have shown that the air near to a torpedo explosion may contain 60 per cent carbon monoxide. Death may be produced by [illegible] per cent in a few minutes and 1 per cent of the gas in air will give [illegible] per cent blood saturation in 15 minutes at rest, and with 10 minutes light work or 7 minutes' hard work. It was gratifying to record that so many recovered with adequate artificial respiration given by first aid parties. The closed breathing sets gave full protection to the rescue party.

Carbon Monoxide in coastal craft.—The carbon monoxide hazard in coastal craft was investigated for the Royal Naval Personnel Research Committee in June and July, 1943, by Surgeon Lieutenant Commander H. E. Holling, R.N.V.R., and members of the Medical Research Council Staff at the Armoured Fighting Vehicles School, Lulworth. Illustrative incidents given in their report as occurring in the first half of 1943 were as follows:—

(1) Shortly before an action a flotilla staff officer could get no response from the engine room staff of his boat. They had been overcome by exhaust gases escaping from the defective packing of a joint.

(2) Within a fortnight of the above incident the engine room staff of another boat were asphyxiated by exhaust gases after an action

[illegible] the penetration [illegible] by an enemy [illegible]

(2) A stoker was found [illegible] in the engine room [illegible] found suffering from the effects of carbon monoxide poisoning. There were small exhaust leaks and the margin of safety in the [illegible] had been reduced by the unauthorized removal of one of the [illegible] ventilators to allow free lowering for a gun mounting.

(3) Six ratings from a motor torpedo boat were transferred to hospital suffering from carbon monoxide asphyxiation. The exhaust leak in this case was from a silencer box, the aluminium [illegible] of which had been corroded by salt water. The leak was obscured by a brass plate bearing the name of the makers.

These are typical instances which were repeatedly encountered amongst coastal forces. The investigating team emphasized the importance not only of the dramatic intoxication of large losses of lives but also the effects on efficiency and the danger to the ship of the minor symptoms such as headache, dizziness, nausea, anxiety, mental retardation and confusion which undoubtedly occur more frequently. They found, however, that under normal conditions the average concentrations in engine rooms would not exceed 0.01 per cent carbon monoxide and that the concentrations in the blood of engine-room crews did not exceed 10 per cent—both figures well within the limits of safety. It is necessary, however, to allow for the danger of leaks, and as the gas is both odourless and colourless the need for an efficient indicator is apparent.

An efficient simple carbon monoxide indicator was not available for use in coastal craft during the war. Canaries or red polls, birds which are sensitive to low concentrations of the gas, were suggested as engine room pets which might give warning of dangerous concentrations to the watchkeepers, but the former were apparently all required for research on anti-malarials and the latter were never used in practice. Towards the end of the war the M.S.A. indicator was used in landing craft carrying vehicles.

Submarine accidents. However frequent cases of carbon monoxide poisoning may be there is always an element of surprise and doubt when cases occur and wrong decisions are frequently made. A torpedo motor started up by accident when the torpedo tube of a submarine was being loaded at Malta in May 1941 filled the torpedo compartment with exhaust fumes. An officer entered the compartment to rescue one of his men who had collapsed and who died later, lost consciousness and was exposed to the gas for six to ten minutes. He was delirious after recovering consciousness and suffered from mental confusion for a long time. For days he was completely blind, then his vision returned gradually although he was still unable to write two months after the incident, partly because of incoordination of fine movements and partly because of loss of memory and word patterns. Later he made a complete recovery. Thus it is seen that in certain individuals the effects of the poisoning may be of quite long duration as opposed to the transient story given in most cases.

A similar incident followed the firing of a practice salvo of torpedoes at

[illegible]

[illegible]

The [illegible] particulate [illegible] monoxide [illegible] breathing apparatus should therefore be worn by men working in [illegible]. Of considerable importance [illegible] particularly [illegible] recognition of [illegible] signs [illegible] hazard.

[illegible] HAZARDS

Undoubtedly nitrous fumes and carbon monoxide have contributed a [illegible] medical history. It is necessary now to refer to [illegible] persons used as [illegible] in fire extinguishers [illegible] addition of domestic refrigerators [illegible] plant [illegible] ships, and the large numbers of [illegible]

Petrol vapour. The increase in numbers of shipborne aircraft which [illegible] between the wars and during the recent war, and the addition to [illegible] tanks and [illegible] compartments added petrol vapour [illegible] hazards which may beset the [illegible]

Petrol vapour is a powerful anaesthetic which will produce loss of [illegible] breathed in high concentrations. The margin between [illegible] small and delay in rescue work or in [illegible] fatal. The higher the air [illegible] of petrol in the atmosphere, [illegible] in the tropics. Furthermore [illegible] at the deck level than [illegible] compartment [illegible] collapsed man is a matter [illegible]

[illegible] frequent occurrence in aircraft [illegible] report from H.M.S. *Furious* [illegible] all but a few hardened cases in [illegible] drunkenness, most men having to be sent up [illegible] the petrol-control compartment). For example [illegible] engaged in catching non-existent flies on the [illegible] incidents have occurred. An officer and two [illegible] valve in a petrol control compartment in H.M.S. [illegible] following a gush of petrol from the valve [illegible] when they were removed from [illegible]. Similar fatal accidents to individuals occurred in the [illegible] H.M. Ships *Glenroy* and *Empress* and in H.M.S. [illegible] including unprotected members of a rescue party, were rendered [illegible] and one man died. Personnel who were not [illegible] soaked [illegible]

[illegible] to [illegible] [illegible] persons [illegible] in a petrol [illegible] [illegible] reported [illegible]

[illegible] such as [illegible] for at least ten minutes [illegible] and should therefore always [illegible] control compartment and used [illegible] respirator is adequate for most [illegible]

General measures [illegible] possible petrol control compartment [illegible] that the ventilation system [illegible] the frequent and adequate cleaning [illegible] in the [illegible] trunking where these are fitted.

Methyl Bromide.—Methyl [illegible] extinguishers or refrigerators and is also used [illegible] a fumigant. Since 1939, 32 cases of poisoning [illegible] been reported in the Navy and excellent [illegible] and Clarke (1944), Gray (1944) and Clarke [illegible] (1944). The first named emphasized the importance [illegible] apparatus whenever a number of similar [illegible] ship and classify cases as follows:—

(1) Acute cases with [illegible] and eyes followed by pulmonary [illegible]
(2) Cases with symptoms [illegible] exposure and occasionally until 48 [illegible] mild intoxication, dizziness and [illegible] interrupted by epileptiform [illegible]
(3) Cases with symptoms [illegible] diminished capacity for physical [illegible]

Gray (1944) [illegible] that may be sustained by repeated [illegible] or fluid or by exposure to high [illegible]

The insidious nature [illegible] and particularly [illegible] suggests the necessity [illegible] with these preparations [illegible] in industry. This problem [illegible] Experimental Station [illegible] p-dichlorobenzene could be [illegible] The [illegible]

Service respirators (Type I, Mark V) afford protection for only ten minutes and the Light Mark III container will protect for only three or four minutes.

On these and other grounds it would appear that the only means for preventing poisoning is to forbid the use in H.M. ships of fire-extinguishing or refrigerating equipment containing this chemical or, failing this, a distinctive smell should be incorporated with it. Service respirators may be used for short periods in emergency, but the limitations of the gas mask in absolute protection should be understood, and for all repair work the use of a total oxygen breathing apparatus is essential. Once again well-planned ventilation systems with good exhaust arrangements will greatly reduce the likelihood of accidents.

The treatment of cases of poisoning is largely symptomatic, oxygen being given if pulmonary oedema develops.

Methyl Chloride. Methyl chloride is used as a refrigerant in domestic refrigerators installed in certain British warships. In January, 1938 Gaulette drew attention to the toxic and fatal hazard when he reported cases which had occurred in an Italian submarine fitted with a methyl chloride air conditioning plant. Subsequently, during the war, methyl chloride intoxication is known to have occurred in the crews of enemy submarines on several occasions and once forced a submarine to surface with most unsatisfactory results from the enemy viewpoint. This serves to emphasize the importance of selecting a non-toxic refrigerant such as freon for use in ships, and the use of methyl chloride refrigerators in warships should be avoided. The symptoms are similar to those of methyl bromide intoxication—progressive drowsiness, apathy, nausea, possibly vomiting, abdominal pains, coma, convulsions and death, and again treatment is symptomatic.

Typical instances showing the poisonous effects of methyl chloride were reported in the early years of the war, chiefly amongst technical personnel. In May, 1940 an engine room artificer developed a headache and became drowsy after repairing leaks in a methyl chloride refrigerator in a ship and then retired to bed with severe headache, dizziness, vomiting and diarrhoea for five days, after which he recovered. Another rating in the vicinity was less seriously affected. In June of the same year an engine room artificer in H.M.S. *Express* when working on a refrigerator which was suspected of leaking lost consciousness and was revived by the use of a Novox machine. In 1941 a rating working in the forward cold store of H.M.S. *Harvester* where the refrigerator was leaking suffered from sickness and vertigo after 10 minutes' exposure, and two men wearing respirators were similarly affected after about 20 minutes, while other workers equipped with the Salvus apparatus were completely protected. No distinctive smell was reported by any of these men. A few months later a rating who had worked on a leaky refrigerator on three consecutive days in H.M.S. *Impulsive* became unsteady on his feet, was mentally confused, lost his appetite and began to hiccough, subsequently becoming delirious, cyanosed and semi-conscious; convulsions supervened and he died 24 hours after reporting sick. This case emphasized the enhanced danger of repeated exposure.

The moral of these accidents is obvious and important; ratings whose duties include the maintenance of refrigeration machinery and officers who are responsible [illegible] should be fully [illegible] with the hazards of refrigerants [illegible] to investigate complaints in domestic refrigerators [illegible] equipment should wear a Salvus or some other form of [illegible] apparatus and [illegible] is given that the refrigerant [illegible] The virtues of freon (dichlorodifluoromethane) [illegible] but even here a query arises when there is a fire risk. The thermal decomposition products of freon which may be encountered at temperatures above 400° C. include small amounts of phosgene and fluorophosgene. The advice of the Chemical Defence Experimental Station, Porton [illegible] is that these substances although highly poisonous are unlikely to be present in toxic concentrations and this view is borne out by the lack of reported incidents despite the fact that freon was widely used throughout the war by the American and British Fleets.

Carbon Tetrachloride.—The low incidence of carbon tetrachloride poisoning in the Navy is of interest as it is widely used in Pyrene fire extinguishers and not infrequently as a cleansing agent or for the degreasing of metal parts. In addition it is of course an effective anthelmintic and is widely used in the treatment of hook worm disease. Carbon tetrachloride possesses, however, a characteristic ethereal chloroform-like odour. Thus workers exposed to toxic concentrations will be aware of the danger provided they are informed that the chemical they are using is poisonous—an important factor in their protection.

A minor accident happened in 1940 when five men working in the engine room of a motor torpedo boat suffered from mild intoxication and discovered that the fire extinguisher had leaked into the bilges. Smarting of the eyes, nausea, vomiting and lassitude were the main complaints and they all made an uneventful recovery. The way in which the excellent properties of this chemical as a cleansing agent may lead to its irregular use has been described by Forbes (1944). French petty officers in a submarine depot ship mess discovered the virtue of carbon tetrachloride contained in Pyrene extinguishers for cleaning their uniforms before going ashore. They used about four pints on different occasions over a three month period and the work was generally carried out in a small space with indifferent ventilation. After a few weeks several of them complained of feeling unwell and eventually three men were admitted to a naval hospital acutely ill. They all showed signs and symptoms of toxic damage to the kidneys and autopsy carried out on the one fatal case revealed a central lobular necrosis of the liver and a tubular nephrosis of the kidneys. Sherman and Brader (1944) described four cases in the United States Navy which all occurred when men were using comparatively large quantities (3 to 5 gallons) to clean guns (two cases), a bomb sight and a carburettor; one man died. The main symptoms were considered to be those of an acute toxic hepatitis. Corcoran, Taylor and Page (1943) described a single case where the predominant lesion was acute toxic nephrosis. The more chronic form of poisoning by this chemical which has been reviewed by Stewart and Witts (1944) and Elkins (1942) is unlikely to be encountered in the Navy as it is not in constant use in naval workshops.

Hence [illegible] ventilation arrangements in compartments where carbon tetrachloride is frequently used requires special attention but once again it would appear that prevention of poisoning would be most satisfactorily achieved by employing innocuous compounds in fire extinguishers or as cleaning agents.

The thermal decomposition products of carbon tetrachloride include phosgene and chlorine but no instances of poisoning due to this cause have been reported during the war.

Hazards of fire fighting in enclosed spaces.—In addition to the obvious dangers of getting burnt and exposure to high concentrations of the chemical vapours referred to above, carbon monoxide, carbon dioxide, oxygen depletion and heavy smoke will always be dangerous factors when there is a vigorous fire in an enclosed space and if ammunition is ignited or the fire follows a high explosive detonation nitrous fumes may be a further danger. The ordinary service gas respirator will not give protection against either carbon monoxide or carbon dioxide and the protection afforded against nitrous fumes and the chemicals of fire extinguishers is limited. Obviously it is quite ineffective in the prevention of oxygen shortage. A complete breathing apparatus such as those described above should always be worn by the more active members of fire parties. At the same time in acute emergencies when complete breathing apparatus is not available it should be remembered that the Service respirator will give considerable protection against nitrous fumes and smoke.

Smoke clouds.—It is widely believed that the smoke clouds which may be used to protect the movements of ships and bodies of troops or to camouflage objectives have [illegible] personnel action *per se*. Under the open-air conditions in which they are generally used this is reasonably true unless a man is exposed to the full blast of a generator. In enclosed and poorly ventilated spaces however smoke clouds may be very dangerous and numerous deaths and cases of serious incapacitation have been reported from smoke poisoning in places such as dug-outs, tunnels and huts when combat troops were training in this country.

Smoke may have been a contributory factor in the causation of the casualties in S.S. *La Monter* and H.M.S. *Partridge* and other clear-cut incidents of smoke poisoning have been reported in ships elsewhere. The spontaneous combustion of a smoke float containing hexachlorethane and zinc and its explosion in H.M.S. *Lothian* in 1946 partially asphyxiated a number of the ship's company and one of them died. Similar incidents have been reported in the U.S. Navy and 85 per cent of the personnel in one ship were reported to have raised temperatures, rapid pulse rates, sore throats, pain in the chest and muscular pains after exposure to a smoke cloud although they recovered in 24 hours. Smoke was found to be most effective for smoking out enemy troops in caves when the lethal effect was again observed. Latterly the use of smoke in exercises was prohibited.

An incident which illustrated the dangers occurred in the Furradino tunnel in Malta in 1943 when a fire broke out amongst smoke making canisters stored in the tunnel and numerous dockyard workers who were sheltering there [illegible] asphyxiated by smoke (Evans 1945) 70 persons were exposed [illegible] the longest exposure being for 20 minutes. Four [illegible] died from asphyxiation whilst still in the tunnel and others died later from bronchopneumonia and pulmonary oedema which were directly attributable to the irritant effects of the particulate zinc chloride cloud which formed the smoke. One man who died later was well enough to discharge himself from hospital after preliminary treatment and walk home. Service respirators which were not worn would have given complete protection during the time of exposure.

CONCLUSION

Atmospheric hazards are not uncommon in naval warfare and are likely to become more numerous if more machines employing diverse chemical substances are introduced into ships. The casualties due to these causes will be reduced by the improved education of all those who might be exposed to the hazard and of the medical staff in the potential dangers.

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Clinical Notes and Cases

A CASE OF TETANUS.

BY

Surgeon Captain J COLBORNE, R N

[illegible] April 1946 the patient was playing Rugby football and [illegible] the mid shaft of the right tibia and fibula.

[illegible] to a naval hospital where he was operated [illegible] inserted through the lower end of the tibia. [illegible] the skin edges and some bruised muscle excised [illegible] sulphonamide powder and the wound sutured. [illegible] deformity corrected—the limb was put in [illegible] supporting slab. [illegible] weight was put [illegible] tetanus serum at the time of operation and [illegible] days thereafter.

[illegible] that the wound [illegible] followed by [illegible] during the [illegible] units three hourly. This treatment was [illegible] until [illegible] anaesthesia. It was [illegible] that it had gaped at the middle [illegible] a little foul smelling [illegible] and the position improved although [illegible] The limb was put up in a [illegible]

[illegible] signs of infection and the limb became [illegible]

[illegible] R.N. Auxiliary Hospital [illegible] 40th April [illegible] operation was [illegible] The leg was placed on a Böhler Braun [illegible]

[illegible] the wound [illegible] plaster [illegible]

It [illegible] the night [illegible] and the [illegible] he [illegible] and a [illegible]

Next [illegible] He [illegible] the night and [illegible] by the following, his [illegible] into [illegible] brought [illegible] at [illegible]

[illegible] that he had had [illegible] and that he had had large doses of [illegible] 150,000 units of A.T.S. [illegible] The patient [illegible] with [illegible] lapsed convulsions became general [illegible] and the pulse became imperceptible [illegible] was ready and this [illegible] t much effect This was followed by [illegible] micamide [illegible] effect and twenty minutes later the pulse was 120 and [illegible] the muscular hypersensibility gradually diminished [illegible] limited to the injured limb—became [illegible] and less in [illegible] the 14th [illegible] solids [illegible] The only [illegible] was observed was during the injection of the large doses of [illegible]

[illegible] recovery [illegible] patient from a large [illegible] whether local treatment [illegible] should be undertaken—was [illegible] for the [illegible] tetanus had followed the removal of the plaster and manipulation [illegible] and it was thought that further [illegible] fracture would [illegible] Drainage was deemed [illegible] previous experience [illegible] cases of gas gangrene had shown that these cases improved [illegible] when the injured limbs were put in plaster

The second problem was whether more antitoxin would be needed and whether he would [illegible] On 15th May it was decided to [illegible] him by giving gradually [illegible] anti-tetanic serum commencing with 0·1 c.c. [illegible] initial dose and doubling the dose till 20 c.c. was given as one dose. This treatment was carried out successfully with a minimum of reaction and on 18th May all [illegible] contractions had ceased. The patient has since continued an uninterrupted recovery from this fracture. It was noted that in spite of some [illegible] severe convulsions of the muscles of the injured limb the bone fragments did not move.

I am indebted to Professor Lambert Rogers, Surgeon Captain W. D. W. Brooks R.N.V.R. and Surgeon Commander G. Weild R.N. for their help and interest in this case.

A CASE OF EARLY TRACHOMA TREATED WITH SULPHAMERAZINE

BY

Surgeon Commander T. C. H. NEIL, R.N.

A PATIENT at R.N. Auxiliary Hospital, Seaforth, during March 1946 had just been surveyed and invalided on account of duodenal ulceration and was about to leave the establishment when he suddenly developed what appeared at first sight to be muco-purulent conjunctivitis of the right eye. Direct smear revealed *no specific* organism and he was kept in hospital and treated in the usual manner with [illegible] washouts, the lids being painted on several occasions with 2 per cent silver nitrate. The condition subsided somewhat but after a week it was observed that there was some thickening of the palpebral conjunctiva, particularly in the lower lid, both retrotarsal folds being involved.

The patient's history revealed that he had returned from the East in September 1945 having served both in Burma and at [illegible] India and Ceylon. Suspicion was aroused that the condition might be trachoma but the fact of its unilaterality was against this. However the typical follicles made their appearance in both lids in a few days' time, the lower lid being so thickened as to evert slightly the lower punctum and cause epiphora. The follicles on the palpebral surface of the upper lid extended right across it but were largest near the inner and outer canthus. On the following day a few follicles were noticed on the cornea.

From the point of view of diagnosis it was decided that the case should be regarded as trachoma. As it was desired to confirm the diagnosis clinically as far as possible he was seen by Mr McKie Reid and Mr Plummer at St Paul's Eye Hospital Liverpool, who both gave it as their opinion that the case was one of trachoma

Examination with the slit lamp revealed a commencing pannus the limbal capillaries could be seen quite definitely beginning to invade the substance of the cornea the upper edge of which in the right eye was slightly hazy Although there was no obvious conjunctival involvement of the left eye the same vessel changes could be seen at the upper limbus with the slit lamp It should be mentioned that owing to the presence of a superadded infection there was swelling and tenderness over the right pre-auricular gland

Scrapings were taken from the conjunctiva on several occasions and were fixed with methyl alcohol and stained with fresh Giemsa's solution (10 drops to 10 c c aq distil) for thirty to forty minutes On the third attempt Halberstadter Prowazek inclusion bodies were demonstrated in the slide in addition azurophilic granules were present which bore a distinct resemblance to Rickettsia bodies It was decided to treat this patient with *sulphamerazine*

The dosage of sulphamerazine was as follows —

1 grm 4 hourly for 48 hours	12 grm
1 grm 6 hourly for 48 hours	8 grm
1 grm 8 hourly for 72 hours	9 grm
Total	29 grm

In addition local treatment was instituted as follows —

Zinc Sulph	gr iv
Sol Adrenalin 1/2000	dr i
Aq distil	℥ i

and lotio ac boric washouts t d s

This treatment produced a marked improvement In a week's time, after the completion of the course the follicles had disappeared from the whole of the palpebral conjunctiva except for a few large ones remaining at the inner and outer canthi In order to make sure of dealing with the infection the lids were painted on two occasions after this with 5 per cent silver nitrate which caused the remaining follicles to disappear Both eyes were now white, the only pannus had disappeared and there was no sign of scarring

The patient wrote to me at the end of October 1946 stating that he had had no symptoms since leaving hospital and that his local eye specialist had told him there was no sign of any recurrence

It is of course realised that this is only one case but it was thought to be of interest as few cases of trachoma have been treated with sulpha drugs, and none so far as I know with sulphamerazine the advantage of which over the rest of the sulpha group is well known

The rapidity of subsidence of all symptoms and the absence of any of the well-known sequelæ were remarkable in this case compared with those treated with the old and often unsatisfactory methods

I am indebted to Surgeon Captain E Gosman Davis for permission to publish this case and to Surgeon Commander W Greaves for his help in preparing and staining the conjunctival scrapings

MYANESIN.

BY

Surgeon Lieutenant-Commander T. A. TURNBULL, R.N.

It is thought that a short report on the use of Myanesin as an adjunct to anaesthesia might be of interest. British Drug Houses Limited very kindly supplied 12 ampoules of this substance for a clinical trial and it was used in this series of 9 cases where relaxation was required.

Myanesin is a synthetic substance producing muscular relaxation without the respiratory depression seen so frequently with curare. Experimental work on animals (Berger and Bradley, 1947) showed no effect on blood pressure or respiration.

All cases reported here were first class risks, and premedication given was omnopon ⅓ gr. with scopolamine 1/150 gr. one and a half hours before operation.

Case 1.—S.B.A., aged 19. Perforated [illegible]. Time: 35 minutes.
Anaesthetic.—Myanesin [illegible] pentothal 0·8 gm. N_2O O_2.
Excellent relaxation was obtained. The patient [illegible] minutes of stopping the anaesthetic and there was no post-operative nausea or vomiting; slight cough.

Case 2.—C.O.A., aged 36. Gastrectomy [illegible]. Time: 110 minutes.
Anaesthetic.—Pentothal 1·0 gm. with [illegible]. Myanesin [illegible] was given prior to opening the peritoneum and a further [illegible] after 90 minutes for closing the peritoneum.
This led to excellent relaxation. There was some [illegible] the peritoneum due to the anaesthetic lightening; the patient [illegible] but this was settled immediately by deepening him. He was sufficiently [illegible] asked for a drink within ten minutes of stopping the anaesthetic.
There was some post-operative vomiting and cough [illegible] but there were no serious pulmonary complications.

Case 3.—Commander, R.N., aged 39. Appendicectomy [illegible] appendix [illegible]. Time: 60 minutes.
Anaesthetic.—Pentothal 1·0 gm. N_2O O_2. Myanesin 7 c.c.
A heavily built and very muscular subject.
Good relaxation was obtained for this difficult appendicectomy and the patient was conscious 15 minutes after operation.
There was no post-operative nausea and no pulmonary complications. There was a definite rise in blood pressure during operation but this appeared to be related to the injection of Myanesin.

Case 4.—A.M.(F.), aged 21. Appendicectomy [illegible] appendix [illegible]. Time: 30 minutes.
Anaesthetic.—Pentothal 0·8 gm. C_3H_6. Myanesin 4 c.c.
Relaxation was unsatisfactory [illegible] Myanesin. This was the first case of the present series and [illegible].
Other than slight post-operative nausea there were no complications and the patient was conscious within a few minutes of stopping the anaesthetic.

Case 5.—S.B.A., aged 19. Appendicectomy (emergency). Time: [illegible] minutes.
Anaesthetic.—Pentothal 0·5 gm. C_3H_6. Myanesin 5 c.c.
Relaxation was good and the patient was conscious within [illegible] of stopping the anaesthetic.
Post-operative nausea, vomiting, and pulmonary complications were absent.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

In [illegible] Myanesin [illegible] patient with minimal [illegible]

Myanesin is given in doses [illegible] intravenously a minute or so before the peritoneum is opened and may be repeated during the operation as required. It may also be combined with pentothal. Rather small quantities were used for the cases reported in this series partly from over caution by the anaesthetist and also because of the small quantities of Myanesin available.

These clinical notes are meant not as an authoritative statement but for medical officers who may not have seen Mr F. Barnett Mallinson's report in the *Lancet*.

BIBLIOGRAPHY

Berger, F. M., and Bradley, W. (1946) *Lancet* 1 97
British Drug Houses Limited (1947) Personal communication
Mallinson, F. Barnett (1947) *Lancet* 1 98

Reviews

PRACTICAL CHEMISTRY FOR MEDICAL STUDENTS. By Wm. Klyne. 1946. Pp. xvi + 460. Edinburgh: E. & S. Livingstone Ltd. Price 20s. 0d. net.

The need for a first-class practical textbook of chemistry adapted to the requirements of medical students has long been recognized by teachers and students. Such a book should treat the whole subject, including physical, inorganic and organic chemistry, with a single standard of thoroughness, but it must at the same time display a critical judgment as to where emphasis should be laid on general principles and where special importance should be given to detailed information. The difficulty is balancing these two desiderata and the particular selections made by different teachers will naturally vary. Mr. Klyne's book satisfies both requirements so admirably that it merits the close attention of every teacher of chemistry for medical students, and it should be warmly welcomed by the students themselves.

The constant relating of theory to practical work marks a final break from the bad old days of the "cookery book" to linger with the indigestible products of which so many generations of students have struggled. Every opportunity is taken to convince the student that his studies, though progressive, are unitary; that his chemical laboratory work is the beginning of medical wisdom and not a mere prelude to it.

The early part of the book, which deals in a general way with such matters as the keeping of records, the importance of controls and the meaning of measurements, though brief, is highly effective. The book covers rather more ground than most students can at present hope to do, as the author realizes, but since there is usually a teacher at hand to direct them, this is an advantage rather than a fault.

The absorption spectrum of carboxyhaemoglobin given in fig. 14.3 (facing p. 412) is misleading in that it fails to indicate (though the text is accurate) the similarity of the absorption spectra of oxyhaemoglobin and carboxyhaemoglobin.

A HANDBOOK OF RADIOGRAPHY. By J. A. Ross, M.A., M.R.C.S., L.R.C.P., D.M.R.E., Radiologist, Alder Hey Children's Hospital, Liverpool; Warrington Infirmary and General Hospital, Warrington; Assistant Lecturer in Radiology, University of Liverpool. Second Edition. 1946. Pp. 364, with numerous small line illustrations. London: H. K. Lewis Ltd. Price 10s. 6d. net.

This little book covers a very large field: in addition to positioning—to which its main part is devoted—care of the patient, theory of radiography, dark-room technique, localization of foreign bodies (including no less than four different methods for those in the eye), stereoscopy, tomography and screenoscopy are dealt with. There is a chapter on neuroradiology and another on the physics of X rays, and even such remote topics as hepatosplenography [illegible] The book will [illegible] [illegible] [illegible] [illegible].

Amongst the [illegible] the very large number of [illegible] and [illegible] required by the inexpert is [illegible] found [illegible] the various positions in the radiographic [illegible] instructions as to when to use non-screen films or [illegible] or not the Bucky apparatus should be used [illegible] as to what size film should be used. [illegible] to the knee there is no mention of [illegible] but nearly a whole page is taken [illegible] to show the semilunar cartilage [illegible] of the knee by the injection of opaque media, both of which [illegible] highly specialized. One of the few positions for which a film size [illegible] is the so-called "vertico-mental" view of the sinuses, for which [illegible] 10 in. film is recommended. In a preceding paragraph on the [illegible] one reads "Detail is improved considerably by the use of cones and diaphragms; the importance of using such aids cannot be [illegible]." The use of an effective cone would reduce the size of the [illegible] smaller than that mentioned.

The book was first published in 1940; that a second edition should be [illegible] must have been in demand, but the reviewer cannot recommend it as being of great help to the occasional radiographer with his [illegible] afloat, and his requirements are better met by the little book by [illegible] and Isenburg. Dr. Ross has increased the number of pages of the book from 126 to 164 since the first edition, but the excellent feature of the [illegible] of including many blank pages amongst the text has not been retained. Some of the line drawings are unattractive.

DEMONSTRATIONS OF PHYSICAL SIGNS IN CLINICAL SURGERY. By Hamilton Bailey, F.R.C.S., F.I.C.S., Surgeon, Royal Northern Hospital, London; Surgeon and [illegible], County Hospital, Chatham; Senior Surgeon, St. Vincent's Clinic and the Italian Hospital; Consulting General Surgeon, Metropolitan Ear, Nose & Throat Hospital, London; Consulting Surgeon, Potters Bar Hospital, Clacton Hospital and Essex County Hospital; formerly External Examiner in Surgery, University of Bristol. Tenth edition (revised). 1946. Pp. [illegible]. 573 illustrations, many coloured. Bristol: John Wright & Sons, Ltd. London: Simpkin Marshall (1941) Ltd. Price 30s. 0d. net.

Once again it is our great pleasure to review this really unique book. Mr. Hamilton Bailey must be becoming rather bored with the flood of eulogies which greets each new edition and he himself admits to some embarrassment at its great popularity in many lands. No first edition by any medical author has ever had more world-wide acclaim: 19 years has seen 10 editions and 7 reprints.

Although primarily intended for senior students and post graduates in the wards, there can be hardly any medical man who will not learn or re-learn something useful from its pages. It is one of the very few medical books which one can pick up, delve into at any page, and become absorbed with interest for as long as one has the time to spare.

It would be difficult to find fault with any of the illustrations, many of these coloured being real works of art, and it is a pleasure to find the textual references so adjacent and so readily discernible. It is a pity that all authors do not follow Mr. Bailey's example in this respect, for there is nothing more irritating to the busy reader than a hunt through the pages of a book for the description of an illustrated condition.

Coupled with our admiration for the ability of the author of this work, we should like to add our congratulations to Messrs. John Wright and Sons for producing one of the most attractive and exquisitely produced medical textbooks of modern times.

A volume which every naval medical officer would appreciate, whether he be ashore or afloat.

NARCOTICS AND DRUG ADDICTION. By Erich Hesse, translated by Frank Gaynor. 1946. Pp. 219. New York: Philosophical Library. Price $3.75.

Comparisons may be odious, but it is impossible for a reviewer to avoid recalling Lewin's "Phantastica" and to wonder why this present volume was ever committed to print. It is obviously of German origin and its legal references refer mainly to the German Criminal Code. No mention is made of any paper later than 1939. The chief and gravest source of censure concerns the language in which it is written; it is translated from the German by one whose qualifications are obscure, and the result is a jargon which is neither German nor English. There is no excuse for slipshod publication of this sort.

THE PHYSIOLOGICAL BASES OF HUMAN NUTRITION. By E. W. H. Cruickshank, M.D., D.Sc., M.R.C.P., Regius Professor of Physiology in the University of Aberdeen. 1946. Pp. 326, illustrated. Edinburgh: E. & S. Livingstone, Ltd. Price 16s. 0d. net.

This book, which is written as much for laymen as for the medical profession, covers a wide sphere. After a brief but interesting summary of the evolution of human dietaries, it outlines the main problems of nutrition throughout the world, but with special reference to those of Great Britain and of the war years. The individual food requirements of the body are specified and the chapters on vitamins are especially enlightening and amplified by suitable pictures. Special chapters are devoted to bread, milk, vegetarianism and the relation of diet to dental caries, and the final chapter deals with the food and agriculture world organization. A complete list of references is to be found at the end of each chapter.

This book is exceptionally readable and up to date—the fact that the extraction percentage of flour was raised to 85 per cent. in March, 1946, is mentioned—and a clear picture of the various methods of food preservation whether by [illegible] dehydration or freezing, is [illegible] and should prove of great interest to [illegible] and whose well-being and comfort are largely dependent upon [illegible], and who are frequently consulted concerning their value.

The author is an acknowledged authority on the physiology of dietetics and other aspects of nutrition, and the book can be recommended with every confidence to those who wish for a straightforward and relatively non-technical assessment of these matters.

It is well produced, amply illustrated, and inexpensive at the price.

The Principles and Practice of War Surgery, with special reference to the biological method of treatment of wounds and fractures. By J. Trueta, M.D., Hon. D.Sc. (Oxon.), Surgeon (E.M.S.) Wingfield Morris Orthopaedic Hospital, Oxford, Acting Surgeon in Charge, Accident Service, Radcliffe Infirmary, formerly Director of Surgery, General Hospital of Catalonia, University of Barcelona. Third Edition. 1946. London: William Heinemann (Medical Books) Ltd. Price 42s. 0d. net.

The typescript of this new, completely revised and enlarged edition of Trueta's work was delivered just as the recent war in the East was coming to an end. It was wisely decided, however, to go ahead with publication and to retain the original title which identified the subject matter with the surgery of war. This is a book which will be of the greatest assistance to any surgeon engaged in traumatic surgery, whether in times of peace or war.

The illustrations are numerous and well executed, and the general format is most pleasing and convenient.

The chapters and divisions are so arranged that it is easy to get at what one wants; the work is thoroughly documented and there is a very full index.

Trueta's name is for ever associated with the closed plaster treatment of wounds, and if he was not the first surgeon to employ the method it is admitted by all that he was the first to perfect this technique on a vast scale, and to produce such excellent all-round results that few surgeons to-day would care to dispute the sound biological principles on which he has, from the beginning of his writings, based all his labours.

Unfortunately, he has had numerous followers during the recent war who have not taken the trouble to digest fully the fundamental principles which he has always insisted upon, with the result that the closed plaster method has had some hard things said about it—the reviewer has had much experience of the method during the past six years and can unhesitatingly refute such criticisms as being unfair and as showing that the surgeons concerned did not possess that complete knowledge of Trueta's teaching which is so essential to success. In this field of surgery it requires but a small error to convert success into dismal failure. No reputable builder will erect a house on foundations which are infirm and deficient.

Before attempting to assume the role of a disciple of Dr. Trueta it is imperative that one should read and follow faithfully the lucid and simple instructions laid down in this his latest and best work.

The volume should be in the hands of every practising naval surgeon.

Evolution of Plastic Surgery. By Maxwell Maltz, M.D. Illustrated. New York: Froben Press. Price [illegible] net.

This [illegible] book [illegible] the field of the evolution of plastic surgery from the Stone Age to modern times. Commencing with primitive man's attempts to repair the human body of the results of disease and warfare, the author traces the history of plastic surgery, devoting sections to the ancient reparative surgery of the East, ancient Greece, Rome, Arabia, and through the centuries to the present day.

Included is an interesting chronology of the evolution of plastic surgery and a section devoted to examples of modern reconstructive surgery. In addition, there are over 100 illustrations.

A most learned and valuable book for anyone interested in this particular field of surgery.

Gynæcological Endocrinology for the Practitioner. By P. M. F. Bishop, D.M. 1946. Pp. viii + 124. Edinburgh: E. & S. Livingstone, Ltd. Price 7s. 6d. net.

This is a most excellent little book, interesting to read, and gives in a concise form the appropriate hormone and the recommended dose for the various gynæcological disturbances.

The appendix of commercial preparations of sex hormones should prove a great help to practitioners.

The Surgery of Repair—Injuries and Burns. By Wing Commander D. N. Matthews, *O.B.E.*, R.A.F.V.R., M.D., M.Ch., F.R.C.S., &c., Surgical Specialist, R.A.F.V.R.; Surgical Officer in Charge, R.A.F. Plastic Unit; Surgical Chief Assistant, Westminster Hospital; Hunterian Professor, Royal College of Surgeons. Second Edition. 1946. Pp. 401, numerous plates and illustrations, many in colour. Oxford: Blackwell Scientific Publications, Ltd. Price 45s. 0d.

Once again it is our privilege to review this excellent book on traumatic surgery by Wing Commander Matthews, and it is a mystery how one who must obviously have worked at high pressure during the late war can have found time to produce such a valuable and up-to-date volume.

Although there is much in the book which will be attempted only by the fully trained plastic surgeon, no general surgeon can fail to improve his knowledge and technique by a perusal of its pages.

Orthopedic surgery has been omitted, but there is a very full and detailed account of the repair of soft tissue loss and injury, with special reference to the face. Nerve and tendon repair are dealt with clearly and with commendable brevity, and the author has avoided the description of alternative measures which are so often confusing and irritating in a book of this kind. Those methods which are of proven value are the only ones described and in many cases very beautifully illustrated.

One can find no reference to the reconstructive surgery of the genitalia though up [illegible] appear to be [illegible] some very brilliant [illegible] have been achieved recently.

The section on burns gives a concise account of the classification, pathology and treatment of this much discussed subject, and if we are still rather confused about the ideal treatment, the author has undoubtedly placed all the facts before us in a clear, straightforward manner with which no person who has had to deal with burns can possibly disagree.

The book is handy in size, exceedingly well produced, and a credit to all concerned. We recommend it with enthusiasm to the naval surgeon, whatever his speciality may be.

Causation of Appendicitis. By A. Rendle Short, M.D., F.R.C.S., Professor of Surgery, University of Bristol; Surgeon, Bristol Royal Infirmary. First Edition. 1946. Pp. 79. Bristol: John Wright & Sons Ltd. Price 10s. 6d. net.

This short monograph attempts to trace the cause of appendicitis by a study of its incidence during the last five centuries in England and in other countries, and by correlation of its incidence with social, dietary and other conditions obtaining in different countries and at different times. A short chapter is devoted, too, to a discussion of local pathological changes held to be causative, but the author does not enter into a full discussion of these factors.

Professor Rendle Short presents interesting material in the field of historical medicine—as for instance in the disease statistics of the seventeenth century—and statistically valuable evidence from the more accurate figures for the incidence of appendicitis during the last half century. His findings, however, add little new to existing evidence, and he appears to underrate two factors of prime importance in any statistical survey of abdominal disease. First, to what extent is the apparent great increase in the incidence of appendicitis due to the increasing readiness of surgeons during the later nineteenth and early twentieth centuries to explore the abdomen? Secondly, the author does not seem to define clearly enough his criteria for making a diagnosis of acute appendicitis.

However, Professor Rendle Short's evidence embraces a wide field, and its clear presentation makes this a valuable contribution to knowledge already in existence with regard to this common though obscure malady.

Artificial Respiration Explained. By Frank C. Eve, M.D., F.R.C.P. 1946. Pp. 76. 32 illustrations. Edinburgh: E. & S. Livingstone Ltd. Price 3s. 0d. (Available in Service Afloat Medical Library.)

Artificial respiration means, to most "first aiders" and indeed also to most doctors, performing Schafer's well known method. The essential purpose of this book is to make a plea for the use, when appropriate, in addition to Schafer's, of other methods—other methods both old and new.

Consideration of the limitations of existing methods led to the inclusion in a new edition of "First Aid in the Royal Navy" (1943) of Eve's rocking method

Although at that time there was very little practical evidence of its value theory and experiment made it appear a reasonable proposition Practical results were subsequently watched but the figures had not reached true statistical significance when demobilization began to interfere with the compilation It may be said however that results were none the less encouraging several instances of the successful use of rocking being reported and it was evident that the venture of describing a new method was being justified

Accordingly the Medical Director General of the Navy supported the preparation by Dr Eve of this book and when it was published authorized its being made available in the Service Afloat Medical Library It contains the author s conception of the need in performing artificial respiration for establishing warmth and circulation as well as ventilation It reports the present situation as regards experimental and practical knowledge of the three main methods (Schafer s Silvester s and Eve s) and also of other methods (e g ' Inverted chest compression Pole top Rib traction Suck and blow inhalators ' &c) It includes brief instructions for the main methods

It is to be hoped that when it has had a wide and wise appreciation the information contained in this book will in fact lead to better results with attempts at artificial respiration This should happen because even a single simple perusal of it must not only increase understanding of the basic problem but also and perhaps even more importantly stimulate thought and discussion The matter is controversial—and happily the author admits this in a book which it is believed may well be a landmark We are now at the forking of the road—one fork is the difficult path by which we find out and practise new and better methods the other the easy comfortable way of shutting our eyes to inconvenient evidence and stoutly maintaining that Schafer s method is always best and all sufficing

Penicillin Its Practical Application Under the General Editorship of Professor Sir Alexander Fleming F R S 1946 Pp 380 London Butterworth & Co Price 30s 0d

As the editor says in his preface this book is not a continuous textbook but a series of independent contributions giving each author s view on the use of penicillin therapy in a disease or in infections of some region of the body

The authors were instructed that this book was not intended to be merely a résumé of all the work which had been done on penicillin but that its object was to tell the practitioner how to use penicillin to best advantage

Some of the contributions are very good and give concise information with a minimum of controversial matter especially those on burns and plastic surgery ophthalmology otorhinolaryngology and dermatology while the chapter addressed to the general practitioner gives a very useful summary of methods of administration and the conditions which are amenable to penicillin therapy

With so much that is good it is a pity that the authors of the chapters on generalized infections on wounds and gas gangrene and on animal diseases did not heed the editor s instructions

The [illegible] into the [illegible] and conclusions at the end [illegible] of little use. The busy practitioner must wade through [illegible] to find the positive guidance on dosage and the spacing of [illegible] tually given on page 126

The auth[illegible] on wounds and gas gangrene are still apparently suffering [illegible] trauma of warfare and cannot get away from the statist[illegible] Army Group but for those who have time to digest the article there [illegible] learnt from their experience

The article [illegible] diseases is more of a résumé of the literature than a summary of [illegible] the use of penicillin to the best advantage in these conditions. The [illegible] paragraph I have ever seen covers nearly three pages (pp 339 342) with [illegible] extracts from the literature the gist of which is given again in a table on page 343

There are a few errors which more careful proof reading would have discovered e g on p 20 the first structural formula for penicillin is printed wrongly on p 35 trolleys is spelt trollies in more than one place on p 50 the first paragraph on the dispensing of penicillin is most ungrammatical but these are very minor blemishes which will right themselves in subsequent editions

On the whole this is a very useful book which will give the busy man the information he wants whilst providing full references to the literature for those who wish to pursue the subject further It should be on every medical man s bookshelf

WON'T THE PEPTICAL RECIDIVISTIC GASTRO DUODENAL ULCERS BE SIMPLE LOCALIZATIONS OF A VIRUS? By Professor Loforte Gonçalves Professor of Pharmacology in the Faculty of Medicine of Porto Alegre Brazil

We have received an interesting booklet on the controversial subject of recurrent gastro duodenal ulcerations

Professor Loforte Gonçalves puts forward the novel theory that a virus similar to that of the simple herpes may be the culprit and he produces some interesting evidence in support of his theory He points out that bile especially destroys the herpetic virus and submits that frequency of ulcers in individuals affected by hepato biliary disorders or in those who have lost their gall bladders lends support to this contention

It is stated that a histopathological study will be presented in a future publication

We have received copies of the following publications, for which we wish to express our thanks —

Medical Press and Circular British Medical Journal Tropical Diseases Bulletin Clinical Journal British Medical Bulletin Journal of the Royal Army Medical Corps, Journal of the Royal Sanitary Institute Guy's Hospital Gazette The Broad Way *St Mary's Hospital Gazette, St Thomas's*

Hospital Gazette   Middlesex Hospital Journal   Proceedings of Staff Meetings of the Mayo Clinic   Journal of the Bowman Gray School of Medicine   University of Sydney Medical Journal   Australian Journal of Experimental Biology and Medical Science   Medical Journal of Australia   Journal of V.D. Information   The Military Surgeon   Ulster Medical Journal   Journal of the Medical Association of Eire   League of Nations Bulletin of the Health Organization   Journal of the Palestine Arab Medical Association   Archiva Medica Belgica   Bulletin International des Services de Santé des Armées   Anales de la Facultad de Medicina de Montevideo   Revue de Médecine Navale   Bibliographical Bulletin, British Legion   News Flashes.

◆

ROYAL NAVY MEDICAL CLUB

Membership of the Royal Navy Medical Club is open to all medical and dental officers on the active and retired lists of the R.N. and permanent R.N.V.R.

The meetings are held annually in London and take the form of a dinner or cocktail party. In the past these have always been enjoyable and informal reunions of shipmates and hospital mates. It is intended to hold the next meeting in April 1947.

The financial obligation is small. A single payment of £2 [illegible] annual payments of £1) secures life membership. There is no subscription, but members pay for their dinners and wines at the annual meetings, the cost being partly defrayed from club funds as circumstances permit.

Those wishing to become members should communicate with the Honorary Secretary, c/o Medical Department of the Navy (Admiralty), giving (a) name, rank (and division if R.N.V.R.), (b) permanent address, and enclosing a cheque for the entrance fee made payable to "The Royal Navy Medical Club."

A limited number of vacancies exist for those medical and dental officers who served in the capacity of temporary surgeons R.N.V.R. during the late war, who might wish to maintain their association with their messmates in the Service, and who may be proposed for membership and seconded by members of the Club.

THE NAVAL MEDICAL COMPASSIONATE FUND

As it is felt that the amount of practical good work which is carried out yearly by the above organization is not fully appreciated by active service medical officers, a short description of the aims and objects of the Fund, and of the benefits accruing from membership is appended.

The Fund exists for the relief of the widows and orphans in necessitous circumstances of naval medical officers, active or retired, who were subscribers to the Fund.

In 1945 the sum of £706 was distributed amongst 11 applicants approved by the Board of Directors.

Examples of a few of the cases helped are as follows:—

(a) Daughter, aged 79, of a surgeon who died in 1866, living on her own with no means other than from charities.
Granted £75. (Total received £1,665 10s. 0d.)

(b) Widow, aged 50, of an officer who died in 1935, has two daughters dependent upon her.
Granted £105. (Total received £715.)

(c) Widow of an officer who died in 1945 who required urgent assistance to tide her over until affairs were settled.
Granted £65.

NAVAL MEDICAL COMPASSIONATE FUND

Account of Receipts and Payments for the Year ended 31st December 194[illegible]

	£ s. d.	£ s. d.
[illegible] 194[illegible]—		
[illegible]	512 19 5	
[illegible]	108 9 4	
		621 8 9
[illegible]	265 0 0	
[illegible]	66 10 0	
[illegible]	40 0 0	
[illegible]	35 0 0	
[illegible]	13 4 5	
		419 14 5
[illegible]		85 15 4
[illegible]		192 2 0
[illegible]		10 7
		£1,[illegible]

	£ s. d.	£ s. d.
Awards to Widows and Orphans		[illegible]
Secretary's Allowance		[illegible]
Auditor		[illegible]
Balance at Bank on 31st December 194[illegible]—		
Current Account	[illegible]	
Deposit Account	[illegible]	
		[illegible]
		£1,[illegible]

[illegible] Receipts and Payments Account [illegible] books and records of the Fund [illegible] have been [illegible].

[illegible] at the Bank of England in the [illegible] December 1946 [illegible] herein as [illegible].

The Balance [illegible] at Bank on Current Account includes the [illegible] £72 0 4 [illegible] interest on [illegible] the Donation Fund.

[illegible] Balances from the National Provincial Bank [illegible] holding of £400 3% Defence Bonds in the [illegible].

[illegible] £40 19s. 0d. were outstanding at [illegible]:—

	£ s. d.
194[illegible]	6 6 0
194[illegible]	14 14 0
194[illegible]	19 19 0
	£40 19 0

[illegible] 194[illegible]

Signed Wm. C. McNICOL
Chartered Accountant
Auditor

In addition to the above Cash Balances [illegible] were standing, at the close of the [illegible] in the names of the Trustees:

- * £10,000 2½% [illegible]
- † £1,000 3½% [illegible]
- † £1,000 [illegible]
- † £1,000 3½% War [illegible]

Bonds to the following amount [illegible]:

- † £400 3% [illegible]

* Original Fund [illegible] of 28th [illegible] 1915

† Invested out of accumulated [illegible]

[illegible] MALONE
Surgeon Rear-Admiral,
Honorary Treasurer

January 1947

U[illegible] is ab[illegible] treas[illegible]

Th[illegible] and an [illegible] of Medic[illegible] at Green[illegible] Hospital [illegible] of the S[illegible] shall be the Deputy Medical [illegible] Medical Department of the Navy [illegible] the honorary secretary shall [illegible] the office [illegible] honorary secretary of the Royal Navy Medical Club [illegible] of subscribers.

Allocation of Grants.—The board [illegible] holds quarterly meetings in January, April, July and October when applications [illegible]

Subscriptions.—The subscription is [illegible] payable annually [illegible] January to the honorary secretary of the Fund and [illegible] of any readers who may wish to become [illegible]

Subscribers must be on the active list [illegible] officers of the Royal Navy at the time of joining, but may continue [illegible] being placed on the retired or reserve lists, or after resignation [illegible]

The orphans and widows of subscribers are eligible for assistance if in necessitous circumstances and provided that at the time of the officer's death his subscription was not more than nine months in arrear.

Apart from subscriptions, donations to the Fund would be welcomed.

It is hoped that the foregoing statement will help to show how worthy the Fund is of consideration and support.

Communications should be addressed to the Honorary Secretary, The Naval Medical Compassionate Fund, Medical Department of the Navy (Admiralty), Queen's House, 64 St. James's Street, S.W.1.

BRITISH LEGION

The British Legion Exhibition at Central Hall, Westminster, was opened on 22nd January by Major-General the Rt. Hon. Earl of Athlone and H.R.H. Princess Alice, Countess of Athlone.

This exhibition shows how the ex-Service movement has developed since the Legion's formation in 1921. In a series of photographs and pictorial panels is depicted the campaign which the British Legion has waged successfully on behalf of all ex-Service men and women during the last quarter of a century. It portrays the varied activities of the Legion from the amalgamation in 1921 of the four main ex-Service organizations, through the years between the wars, to the late war, and shows how the experience of those 25 years is being used to tackle the problems of men and women who served in the recent war.

Only a small part of the work done by the Legion can be illustrated in the Exhibition but it covers a vast field. Illustrations depict the delightful convalescent homes distributed over the British Isles for those who need a few weeks' rest and care; their settlements and homes for patients suffering from tuberculosis; and for orphans of ex-Service personnel and children from homes which have been broken up. The available 80 beds for the rheumatism and arthritis clinic at Three Counties Hospital, Arlesey, are always occupied, and the Legion has established homes for rehabilitation of the disabled. Walton House has been opened recently as a test home for giving the paraplegic and their families an opportunity to rebuild family life. Wives are given instruction in how to treat and care for their husbands during their month's stay there, the work being on the same lines as that of the Ministry of Pensions Paraplegic Hospital, Stoke Mandeville.

[illegible] 1918 [illegible]

[illegible] they [illegible] capt[illegible] painted [illegible] life [illegible] from [illegible]

Th[illegible] by bull[illegible]

M[illegible] The [illegible] make [illegible]

[illegible] station [illegible] that [illegible] on [illegible] that it [illegible]

◆

News of the Service

OBITUARY.

[illegible] H. Jenkins, M.B., Ch.B., R.N.V.R. [illegible] on 26th September [illegible] at [illegible]dsbury, Gloucester. Born in 1904 [illegible] at Bristol [illegible] 1928.

Surgeon [illegible] Jenkins entered the Royal Naval V[illegible] [illegible] He was promoted to Surgeon Lieutenant Commander [illegible] of Surgeon Commander [illegible] Mobilized [illegible] 1939 he was appointed to the Royal Marine [illegible] Hospital [illegible] he also served in H.M.S. *Royal* [illegible] H.M.S. [illegible] R.N. Hospital [illegible] At the time of Surgeon Commander Jenkins [illegible] the Royal Naval Torpedo Factory, Greenock [illegible] writes:

Born [illegible] he was the son of the Rev. Hugh Jenkins, M.A. He was [illegible] York, and studied medicine at Leeds and then at Bristol University [illegible] After house appointment [illegible] S[illegible] and was stationed [illegible] [illegible] England and became [illegible] the late Dr MacW[illegible] [illegible] partner and [illegible] to the practice [illegible]

H[illegible] [illegible]

THE LATE MISS N K WESTAWAY, MATRON, Q A R N N S

At morning service in the Church of the Good Shepherd, Royal Naval Hospital, [illegible] on Sunday 9th February 1947 a memorial tablet to the late Miss N K Westaway was unveiled by the Matron-in-Chief (Miss N [illegible] *R R C*). The service was conducted by the hospital chaplain the Rev [illegible] M A K H C. The tablet had been subscribed for by the staff of the Royal Naval Hospital, Hong Kong, where Miss Westaway was serving as Matron at the time of her death.

Surgeon Captain E F Strugnell R N, deputising for Surgeon Rear Admiral Wh[illegible] who was prevented by illness from attending, spoke on behalf of the medical officers, R N Hospital, Hong Kong, requesting the Matron-in-Chief to unveil the memorial to their late Matron whose service had been brought to a premature end by internment and death in Japanese [illegible] Hong Kong shortly after its recapture from the Japanese.

The Matron-in-Chief unveiled the memorial [illegible] and thanks [illegible] for the [illegible] duty of North [illegible] Westaway Matron Q A R N N S.

The ceremony was attended by a sister of the late Miss Westaway and other personal friends and a full congregation of representatives from the medical [illegible] Sisters, V A Ds and both staff of the hospital and patients.

HONOURS AND AWARDS

Legion of Merit Degree of Commander

Temporary Surgeon Rear Admiral Sir Gordon Gordon-Taylor *K B E*, *C B*, M S, M B, F R C S, for distinguished services to the U S Army Medical Department.

Legion of Merit Degree of Legionnaire

Temporary Surgeon Lieutenant Commander A P Curtin M R C S, L R C P, R N V R, for services to the U S A during the war.

PROMOTIONS

Surgeon Lieutenant Commander C J Mellon promoted to Surgeon Commander 25th May 1946.

Acting Surgeon Lieutenant Commander G A S Anthony promoted to Surgeon Lieutenant Commander 14th June 1946.

RETIREMENTS

Surgeon Captain (Retired) J H B Martin released 9th September 1946.

Surgeon Captain (Retired) G H Hayes released 30th September 1946.

Surgeon Captain (Retired) J G [illegible] released 16th September 1946.

Surgeon Captain (Retired) [illegible] released 3rd October 1946.

Surgeon Captain (Retired) [illegible] Goodwin reverted to retired list (medically unfit) 7th September 1946.

Surgeon Captain (Retired) [illegible] MacL[illegible] Alexander for release locally in South Africa 22nd August 1946.

Surgeon Commander G C Newman placed on retired list (medically unfit) 2nd November 1946.

Surgeon Captain (Retired) [illegible] released 23rd September 1946.

Surgeon Lieutenant Commander (Emergency) D [illegible] September 1946

Surgeon [illegible] C L D Ellis released 17th September 1946 (amended)

Surgeon [illegible] S Bradbury release cancelled

Surgeon [illegible] Commander (Emergency) R M Copland released 30th September 1946

Surgeon [illegible] G Ferguson reverted to retired list (medically unfit) release date 24th [illegible] 1946

Surgeon Captain (Retired) H F Scargill released 15th July 1946 (amended)

Surgeon Captain (Retired) J H Bardett released 1st October 1946

Surgeon Captain (Retired) R K Shaw released 5th November 1946 (amended)

Surgeon Rear-Admiral H R B Hall placed on retired list (age) and dispersed 23rd October 1946

Surgeon [illegible] J Keall placed on retired list (own request) 21st September 1946

Surgeon Commander E S I Wheeler placed on retired list (own request) 17th September 1946

Surgeon Captain (Retired) F I Fitzmaurice released (medically unfit) 17th August 1946 (amended)

Surgeon Captain W I Beattie placed on retired list (age) and reappointed 23rd July 1946

Surgeon Captain (Retired) I B Logan released 15th October 1946

Surgeon Rear Admiral (Retired) R I P Gray reverted to retired list (medically unfit) 19th October 1946

Surgeon Captain I F Heath placed on retired list (age) and reappointed 9th November 1946

Surgeon Rear Admiral F J D Twigg released 31st August 1946 (amended)

Surgeon Commander (D) H P Buchanan released 26th September 1946

Surgeon Captain (Retired) G I Ritchie released 21st November 1946

Surgeon Commander (Retired) A J Fielding released in South Africa 23rd April 1946 (amended)

Surgeon Captain (Retired) A Craig released 11th December 1946

Surgeon Captain G W Woodhouse placed on retired list (age) and reappointed 7th December 1946

Surgeon Commander S G French placed on retired list (own request) 22nd November 1946

TRANSFERS TO THE PERMANENT LIST.

Surgeon Lieutenant Commander (Emergency) M Ure transfer to Permanent List cancelled

Surgeon Lieutenant (D) J A R Hemsted transferred to Permanent List R N 1st November 1946 with ante-date of seniority as Surgeon Lieutenant (D) to 16th December 1942

Surgeon Lieutenant (D) N A McCaw transferred to Permanent List 1st November 1946 with seniority as Surgeon Lieutenant (D) to 4th January 1946

Surgeon Lieutenant Commander The Hon A G Gathorne Hardy transferred to Permanent List 1st November 1946 with ante-date of seniority as Surgeon Lieutenant Commander to 6th October 1944

Surgeon Lieutenant W H B Ellis transferred to Permanent List 1st November 1946 with ante-date of seniority as Surgeon Lieutenant to 7th March 1946

Surgeon Lieutenant B Geoghegan transferred to Permanent List 1st November 1946 with ante-date of seniority as Surgeon Lieutenant to 18th May 1945

Surgeon Lieutenant E A Lennan transferred to Permanent List 1st November 1946 with ante-date of seniority as Surgeon Lieutenant to 22nd August 1945

Surgeon Lieutenant R W Simpson transferred to Permanent List 20th December 1945 with ante date of seniority as Surgeon Lieutenant to 21st July 1943 (amended)

Acting Surgeon [illegible] Commander [illegible] [illegible] L. [illegible] [illegible] 1946 [illegible] seniority [illegible] 3rd May 1946.

WARDMASTER OFFICERS.

RETIREMENTS

Comd. Wardmaster T. W. Ashford placed on retired list [illegible] 28th September 1946.

TRANSFERS TO PERMANENT LIST

Temporary Acting Comd. Wardmaster E. W. Titterton transferred to permanent List in rank of Wt. Wardmaster 28th September 1946 with seniority [illegible] 1946 (to retain acting rank of Comd. Wardmaster).

ROYAL NAVY VOLUNTEER RESERVE.

PROMOTIONS

Surgeon Lieutenant Commander R. D. Bradshaw promoted Surgeon Commander on retired list 5th May 1946 and reappointed (to continue to serve in acting rank of Surgeon Commander) (amended).

Temporary Acting Surgeon Lieutenant Commander W. A. Burnett promoted Temporary Surgeon Lieutenant Commander 16th August 1946.

Temporary Acting Surgeon Lieutenant-Commander (D) G. A. Combe promoted Temporary Surgeon Lieutenant Commander (D) 3rd September 1946.

Temporary Acting Surgeon Lieutenant-Commander (D) R. Dunstan promoted Temporary Surgeon Lieutenant Commander (D) 5th November 1946.

Temporary Acting Surgeon Lieutenant Commander (D) I. D. Hodgson promoted Temporary Surgeon Lieutenant Commander (D) 6th November 1946.

Surgeon Lieutenant Commander (D) R. W. Stevens promoted Surgeon Commander (D) and reappointed 31st October 1946.

RETIREMENTS

(Senior Officers only.)

Further Class A Releases of Junior Officers not included

Temporary Surgeon Commander C. H. Tern released 13th September 1946.

Surgeon Commander (Retired) R. D. Bradshaw released 4th September 1946 in acting rank of Surgeon Commander (amended).

Surgeon Commander (Retired) W. I. Gerrard released 31st January 1946. Granted War Service Rank of Surgeon Captain (amended).

Temporary Surgeon Lieutenant Commander Mrs. A. G. Rutherford released 1st October 1946.

Surgeon Commander W. H. Bradshaw placed on retired list (age) 20th September 1946.

Surgeon Commander D. W. Bawtree released (date to be reported).

Temporary Surgeon Lieutenant Commander A. S. Nicol released in rank of Temporary Surgeon Commander 26th September 1946 (amended).

Temporary Surgeon Commander T. A. Hampton released 25th November 1946.

GRANTED EXTENDED SERVICE COMMISSIONS

Surgeon Lieutenant Commander E. M. Laurent granted four years Extended Service Commission 15th August 1946.

Surgeon Lieutenant (D) D. E. Meikle granted four years Extended Service Commission 1st August 1946.

Temporary Surgeon Lieutenant (D) R. McInnes granted four years Extended Service Commission 14th August 1946.

Temporary Surgeon Lieutenant (D) [illegible] Royal [illegible] [illegible] [illegible] 1946.

Temporary Surgeon Lieutenant (D) [illegible] [illegible] 1946.

[illegible] granted [illegible] [illegible] 1946.

Temporary Surgeon Lieutenant [illegible] [illegible] 1946.

[illegible] Lieutenant [illegible] [illegible] granted [illegible] [illegible].

[illegible] [illegible] 4th November 1946.

Temporary Surgeon Lieutenant W. [illegible] [illegible] 1st November 1946.

Temporary Surgeon Lieutenant D. [illegible] [illegible] 18th November 1946.

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

RETIREMENTS

(Senior Officers only.)

Acting Senior Sister Miss W. M. Tapper released 13th September 1946.
Matron (Retired) Miss N. I. Jarvis released 1st October 1946.
Acting Senior Sister Miss J. D. Muir released 30th September 1946.
Acting Senior Sister Miss M. E. Phillips released 12th November 1946.

TRANSFERS TO PERMANENT LIST

Nursing Sister Miss L. M. Richardson transfer to Permanent Service now cancelled.

Preparations.

[illegible] Drug Co. [illegible] recently a booklet [illegible] physicians [illegible] the principal indications [illegible] supplements give detailed information [illegible] a list of diseases in which this [illegible] the results [illegible] Supplements [illegible] available [illegible] graphs [illegible] Many [illegible] has been brought up [illegible]

DIIODOHYDROXYQUINOLINE

Savory & Moore [illegible] diiodohydroxyquinoline [illegible]

As a result of [illegible] having a number of [illegible] from being more effective [illegible] retention [illegible] Diiodohydroxyquinoline is issued in tablets [illegible] tablets for twenty [illegible] type Diiodohydroxyquinoline [illegible] with emetine injections [illegible]

Brochures relating [illegible] respective manufacturers.

Notice.

The office of "The Journal of the Royal Naval Medical Service" has now returned to Royal Naval Hospital, Haslar, Gosport

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The Editors invite Medical Officers to send in Original Papers on professional subjects travel personal experiences &c. Items of news and matters of interest to the Naval Medical Service will be welcomed from ships and establishments on home and foreign stations

All Articles or Communications published in the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE will become the property of the Journal with full copyright powers unless the author declares when sending the Article that he desires to reserve the copyright to himself

The Harvard system should be employed for bibliographical references, these references being arranged in alphabetical order of the authors names at the end of the contribution, thus "Smith F G (1935) *J roy nav med Serv*, **22**, 53 In the text a reference to a publication should be cited by giving the author and, in brackets the date thus "Smith (1935) believed this to be due etc

All Communications should reach the Editors on or before the First of the Month preceding the date of issue. Unless clearly written they should be typed in order to avoid mistakes and they should be addressed to the Editors JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE, Royal Naval Hospital Haslar Gosport

The JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE is published quarterly, four numbers comprising one volume

The Subscription is 20s per annum (postage included) payable on January 1 of each year but should a subscriber wish to commence at another quarter he may do so by payment at the rate of 5s per copy All subscriptions are payable in advance Single copies can be obtained at 6s per copy Cheques or Postal Orders for Subscriptions should be crossed "Lloyds Bank, Ltd," and be made payable to the Manager, JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE, Royal Naval Hospital Haslar, Gosport, to whom all communications relating to subscriptions, &c, should be addressed

The payment of subscriptions by Banker's Order is recommended as it relieves the Subscriber of the necessity of forwarding a cheque each year and simplifies the keeping of accounts

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VOLUME XXXIII APRIL 1947 No 2

Journal
of the
Royal Naval Medical Service.

Articles.

THE ROYAL NAVAL MEDICAL SCHOOL

BY

Surgeon Captain R W MUSSEN, R.N

On 1st May 1912, the Royal Naval Medical School was opened at Greenwich College by Admiral Prince Louis of Battenberg, then First Sea Lord, in the presence of the Medical Director General of the Navy, Sir James Porter, with representatives of the Services and of the medical profession. In his speech Prince Louis congratulated the newly entered naval surgeons who represented the first course and said that it was most necessary to the efficiency of the naval service as a whole that they should avail themselves fully of the medical advantages now afforded by this school.

The School, which was opened with such a flourish, owed its inception to the recommendations of the Durnford Committee, one of those bodies which from time to time, when all has not seemed well with the naval medical branch, have been called upon to inquire into the conditions of service of medical officers and to suggest steps for improvement. Among the specific terms of reference of this particular committee was an inquiry into the arrangements for the post graduate education of officers; it seems that this aspect of the matter was considered at least as important as conditions of pay.

Courses for newly entered medical officers were first started at Haslar Hospital in 1880, instead of preliminary training with Army entrants at Netley Military Hospital as had been the custom previously. Instruction continued here for many years under rather crowded conditions, with general and naval hygiene, hospital work and journals, physical training and dentistry forming the main subjects of the syllabus. During these years the new specialities of tropical medicine, bacteriology and clinical pathology, skiagraphy and anæsthetics were added gradually. In 1889 the course was extended to four months and lectures and instruction on diseases met with on foreign stations were first introduced.

Corresponding arrangements had been made first in 1889 for other medical officers during their Service career to go through a post-graduate course of three months' duration at a London teaching hospital every eight years provided the exigencies of the Service permitted. These courses continued at a varying tempo for many years, being much appreciated by the officers who were lucky enough to be selected but causing some dissatisfaction among many officers who could not be spared for such instruction.

The Durnford Committee considered these matters at some length and recommended that a naval medical school be founded at R.N. College, Greenwich, in order to co-ordinate the various aspects of post-graduate training of medical officers. The committee believed that such a school would add considerably to the prestige and reputation of the Service and that the opportunities for scientific research which would be encouraged would afford an invaluable stimulus to all types of men. The man of great natural ability would find his *métier* in research work which might be of lasting value to the health of the Navy, and the average man would be stimulated to take keener interest in his work through the progressive development of his subject by colleagues who had a more specialized knowledge.

The medical school which started in this way was thus responsible for the instruction of medical officers in three categories:—

(1) Acting Surgeons on entry into the Navy, who were to be given a course of six months' duration, the first two months to be spent at Greenwich and the last four months at Haslar.

(2) Surgeons of between four and a half and six and a half years' seniority, who were to be given a course of six months divided between general medical and surgical instruction at London teaching hospitals and instruction in naval hygiene and clinical pathology at the Naval Medical School in order to prepare them for examination for Staff Surgeon.

(3) Medical officers of not less than fourteen years' seniority, who were to be given a second post-graduate course of three months' duration on any special subject at a London hospital, such a course being arranged to suit individual requirements and not involving any examination afterwards.

In this way the Naval Medical School became the centre responsible for the correlation of post-graduate instruction, performing these duties partly at Greenwich and to a certain extent assigning special clinical instruction to a London teaching hospital. It was recognized that if the naval medical service was to take its proper place in the medical profession, to become the efficient service which it should be and, perhaps from the recruiting point of view the most important point, if it were to be *recognized* as such, its principal teaching centre must be in touch with the scientific world. The principal members of the civilian medical profession must get to know what the Service was doing or could do, and the Service must be brought in contact with modern schools of thought.

The School which was launched in this way was placed on three floors of a portion of the Queen Anne Block at Greenwich College, where it became well known to many naval medical officers. The original staff was small, consisting of two Fleet Surgeons and a number of laboratory assistants and other civilian technical staff. Instruction in analysis of foods, air and water was at first carried out in the department of chemistry of the Naval College, but very soon it was realized that such instruction should be concentrated more appropriately in the medical school and a civilian officer with knowledge of practical hygiene and chemistry was appointed.

The School was at this time fortunate enough to have a close association with the Dreadnought Hospital, situated alongside the College, and it was possible to reserve beds there for naval ratings suffering from tropical diseases who were looked after by the naval medical staff of the School. There was sufficient clinical material not only in the form of tropical diseases but also in general medicine and surgery to provide a very useful background for instruction. Morbid specimens were obtainable for demonstrations and quite a large amount of research was possible.

At the same time the Naval Medical School was recognized by London University as a school of the University and certificates of attendance were accepted when required for higher diplomas. This of course not only added to the prestige of the School but was also of great assistance to medical officers who were working for higher examinations such as the Diploma in Public Health.

Two years later the first world war started and all courses for medical officers at the School were stopped. The staff was reduced and the main activities of the following years consisted of the care of the special beds at the Seaman's Hospital, bacteriological and chemical examination of water and air supplies, and routine pathology. In 1916 the School first produced T.A.B. vaccine for naval use, an activity which has continued ever since with great financial saving to the Navy as in most years the value of the vaccine produced in terms of the amount which it would cost to purchase represents more than the salaries and upkeep of the whole of the Naval Medical School. The overall low incidence of typhoid and paratyphoid cases in two wars and in the period between has shown that this vaccine has contributed to the health of the Navy all over the world.

It was several years before the School really got started again after the 1914–1918 war. Entry of medical officers into the Navy diminished and later when courses were resumed for these individuals Haslar was used once more for this purpose as it had been prior to 1912. Courses for Surgeon Lieutenant Commanders for promotion to Surgeon Commander (as the titles had now become) were recommenced at Greenwich, and other medical officers, who were given three-month courses in special subjects at civil hospitals, were also under the control and direction of the Naval Medical School.

During the following years the work of the School continued, promotion courses being arranged for officers at intervals. It may be that these courses were rather spasmodic as it was not always possible to spare individuals for them owing to the periodic shortage of doctors in the Service. The course was of four months' duration, of which the first two months were spent at the London Hospital where clinical instruction was given in general medicine and surgery, and the second two months at the Naval Medical School with tuition in general hygiene and clinical pathology and bacteriology. This was followed by an examination, the Gilbert Blane Medal being awarded to the officer who distinguished himself by obtaining the highest marks and accelerated promotion being given to those who obtained over 75 per cent.

The association with the Dreadnought Hospital had come to an end after the war partly owing to the lack of cases of tropical diseases and partly through the alternative facilities at the London Hospital for general clinical work. In the same way the relationship with London University ended in 1931 owing to the fact that the Admiralty were unable to comply with certain of the new statutes of the University Act of 1926 which required control by the Senate of the finance of education and of appointments to the teaching staff of schools attached to the University. This was obviously impossible in the case of the Naval Medical School and in any case it seemed that the University was no longer desirous of continuing an association with schools and institutions which would not take part in the social and academic part of general university life and over which it had no control.

During these years much research work was performed at the School possibly the best known being Dudley's investigations into the epidemiology and prophylaxis of diphtheria which he was able to carry out at the Greenwich Hospital School at that time situated beside the Naval College though subsequently removed to Holbrook in Suffolk. In this large community of boys from naval families all over the country he had the material for outstanding contributions to research. In the same way much *ad hoc* research was continued in matters of importance to the Service, these varying from the work of Frederick on water supply and hazards of confined spaces to that of Ramsford on typhoid vaccine. The staff were also very fully occupied in representing the Navy at meetings and conferences relating to medical science and in giving the answers to many questions asked by Service departments in matters of hygiene and epidemiology.

In 1938 the Medical Department was much concerned at the high incidence of rheumatic infections at boys' training establishments. There had always been much acute rheumatism scarlet fever and tonsillitis at these places and matters came to a head in H M S *Caledonia* a converted liner used as a training ship at Rosyth, where the incidence of acute rheumatism became alarming. Dr C A Green was lent to the Naval Medical School by the Empire Rheumatism Council and was able to carry out much important work upon the relationship of streptococcal infection and rheumatism and on the epidemiology and therapy of acute rheumatism.

The association with the Royal Naval College, Greenwich continued till the outbreak of war in 1939. The twenty seven years' relationship with the College had been a happy one with many opportunities for meeting and working with specialists in other branches of the Service and of science and with the membership of one of the finest Service messes in the world. It had been arranged that if war came the primary duty of the School would be production and that this function could be performed more suitably in a less vulnerable area than Greenwich.

Accordingly the Naval Medical School was uprooted with benches, laboratory gear, animals, books and other impedimenta and eventually came to rest for the time being in a private house which was taken in Clevedon, Somerset. Here the work of vaccine production continued, increased enormously of course by the requirements of the expanding Navy. With new ships, establishments and camps, and new equipment, many fresh epidemiological and physiological problems arose, to which an effort to find an answer was made.

In 1940 it was decided to add tetanus toxoid to the existing typhoid vaccine and to immunize personnel against typhoid and tetanus concurrently. The School took on the production of tetanus toxoid, with a resultant very large saving of the public money. This continued until 1945, when the war ended, and as tetanus has never been regarded as a particular hazard of the Navy in peacetime immunization was discontinued and the production of toxoid ceased.

In 1943, when the benefit of penicillin became apparent, and when the supply of the substance was rather difficult, arrangements were made to produce it at the Naval Medical School. This involved rather extensive equipment which was installed under the supervision of Surgeon Commander C. A. Green, R.N.V.R. (as he had now become). Large quantities of penicillin were produced before this activity was stopped in June, 1946, by which time it was obvious that penicillin as produced by commercial firms was becoming purer and cheaper, and that it was no longer necessary, reasonable or economical for the Navy to manufacture its own supply.

At the same time, when supplies of penicillin became available for general use in the Navy, efforts were made to obtain some validation of results by means of a questionnaire filled in by medical officers using the material in treatment of patients and forwarded to the Medical School. It soon became obvious, with the tremendously varied conditions in which penicillin was used—surgical, medical, dermatological and ophthalmological—in most cases without bacteriological control, that it was not possible to get any real information out of this study. Such an investigation is possible only when carried out in a particular unit by a team which is able to follow up each case from beginning to end, with full co-ordination of clinical, bacteriological and other specialist facilities. It is not possible to carry it out in an establishment which receives all its information in a form or questionnaire, often not filled in fully.

The validation of the treatment of syphilis by penicillin seemed more promising at first, as it was possible to obtain sera from patients and to carry out quantitative Kolmer, Wassermann and Kahn tests at Clevedon. Owing to demobilization, however, the follow-ups have been very disappointing, and more recent doubts as to the nature of the penicillins, with their different fractions varying with different batches and different producers, have made the value of the follow-up questionable from a scientific point of view. It is now really the duty of the chemist to estimate and standardize the individual penicillins, in itself a very difficult task.

Now it must be obvious from this brief account of the history and activities of the Naval Medical School that it has been, in the past, very much concerned with preventive medicine and bacteriology. It may be said, possibly, that this type of work has been rather over emphasized in an establishment which should be concerned with all aspects of the duties of the naval medical officer and that the work of the School and the curriculum of future courses should be broadened.

The School is, in fact, a valuable heritage of the naval medical service and as such must always be progressive. In 1912, when it was founded, bacteriology and clinical pathology were relatively fresh subjects and were looked upon possibly with greater optimism than they are now as the solution of the problems of sickness and invalidism. Again, when the school first started preventive medicine meant the control and prevention of communicable disease, though now we would regard it in a broader sense as helping the individual to attain optimum health, efficiency and well being.

If we accept this broader definition as that of the duties of a medical officer it becomes obvious that he should have some knowledge not only of the treatment of disease and injury, and of hygiene in its older interpretation, but of many other matters which concern the efficiency and well being of naval personnel and which were not, in the past, made the subject of special instruction. These include such diverse topics as the physiology of heat and cold, lighting, noise, clothing and other matters which concern the environmental conditions of the sailor, as well as the special problems of aviation, submarines and diving.

Most of these matters involve a knowledge of physiology and much work has been done on them by the naval and civilian scientists working for the Royal Naval Personnel Research Committee associated with the Medical Research Council and by those attached to the Royal Naval Physiological Laboratory. It would not be possible or reasonable and, in fact, would be a very bad thing to turn the Naval medical service generally into a collection of physiologists and pure scientists. It does seem, however, that the naval doctor has a very important role to play as a field observer of conditions of the Fleet.

Medical officers have an opportunity of observing under active service conditions the reactions of men to their environment in all types of ships, in all climates, and they should be fitted by special training in applied physiology in order to equip them for the proper performance of their duties. It may be that a certain proportion will show a particular bent for this type of work and will become specialists in physiology, though for the others it will be only a part—though a very important part—of their knowledge as doctors who have specialized in marine medicine.

When the School was founded the Durnford Committee had realized that the conditions under which a naval medical officer works are peculiar to the Naval Service, and that his training must, therefore, be directed to a specific end to fit him for the special duties which he is required to perform. When courses for medical officers start again at the Naval Medical School it should be possible to develop a full curriculum in which this specialty of marine medicine will be covered in all its different aspects, stressing the many subjects from tropical disease, mass radiography, venereal disease, service-afloat microscopy, burns and blast, &c to general hygiene in the submarine hazards of confined spaces and applied physiology, about which the newly qualified doctor generally knows little

There is also much to be said in favour of short courses on environmental physiology and general hygiene for executive and other non medical officers Most naval officers would gain much by some instruction on the reactions of man to his environment though this applies particularly to those in submarines where the safety and efficiency of many are very much dependent on a knowledge of these subjects The Naval Medical School should be an institute where research is done and encouraged but even more importantly where the advances in knowledge are brought to the ordinary officer whether he be doctor or not

THE USE AND LIMITATIONS OF THE PORTABLE SERVICE-AFLOAT X-RAY UNIT

BY

Surgeon Lieutenant-Commander G L HARDMAN, R N

"I regret that this man's X rays were not sent with him they were taken by a portable machine and are not first class quality"

THE above is an extract from a communication written by the medical officer of an aircraft carrier about a patient who was being sent to hospital with an injury to his knee

Properly used the portable machine in his ship would be able to take first class skiagrams of the extremities and skiagrams of adequate diagnostic quality of almost all other parts of the body These units are not toys or something inferior they are used extensively for minor work in the X ray departments of hospitals and for a certain amount of heavy work on the wards when a patient cannot be moved For an appreciable part of last year a Victor F 45—one of the commonest service afloat units—was used in the X ray department of R N Hospital Haslar for all the minor work and it is now in use in a tuberculosis ward for chest radiography This is exactly the same portable unit that is supplied to ships and to sick quarters ashore The reason that much of the work produced by these units is disappointing is that medical officers often do not know how to work them and have no simple book of instructions to which to refer If however the principles are understood, the unit should be managed by anyone without difficulty Positioning is an anatomical problem which should be easy for a doctor the setting up and working of the machine is simple and the processing of the films can be standardized by using a time and temperature technique

X rays are electro magnetic vibrations in the ether of the same nature as light or wireless waves but of different frequency and wave length Their wave length is shorter than that of visible light and considerably shorter than those used in radio The vibrations are produced by the impact of high speed particles of negative electricity electrons against a hard tungsten target

The X ray tube contains a filament also of tungsten—the cathode—which is heated to incandescence by passing a low tension current through it when the filament reaches a certain temperature electrons are emitted The number of electrons is proportional to the heat of the filament which varies with the current passing through it It is possible, therefore, to control the number of electrons formed at the cathode by regulating the filament current At the other end of the tube is the anode which commonly consists of a massive copper block into the face of which is inserted the tungsten target on which the electrons are arrested to produce the X radiation On making the anode a positive potential relative to the cathode the electrons formed on the filament of the latter will pass to the anode The greater the difference of potential between the anode and the cathode the higher will be the speed of the electron stream the greater the effect of its collision on the tungsten target and the shorter the wave length of the resulting radiation For the production of X rays used in diagnosis the potential difference between the anode and the cathode of the tube varies from 40 000 to 90 000 volts The higher the voltage the shorter will be the wave length of the radiation and the greater its energy and penetrating power

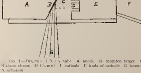


Fig. 1—Diagram of X ray tube A anode B tungsten target C electron stream D filament E cathode F leads of cathode G beam of X radiation

The X ray tube is highly evacuated otherwise the filament would burn out and the electrons would be unable to obtain the necessary high speed on their way to the anode owing to collision with particles of residual gas The high voltage is produced by a transformer which is a commonly used electrical device for stepping up an alternating low voltage current to a higher voltage There is of course at the same time a corresponding lowering of the quantity or amperage of the current The product of the voltage amperage input into a transformer is equal to the product of the voltage amperage output from it less a small conversion loss (under 5 per cent) If a domestic power line is stepped up from 220 to 70 000 volts the amperage will be reduced from 15 to 40/1 000 of an ampere or 40 milliamperes

The voltage output of the transformer is regulated by using different tappings on its input side and the milliamperage through the tube is controlled by varying the current through its filament with a rheostat The quality of the radiation depends on the voltage the quantity on the amperage The shorter the wave length of the radiation the greater its penetrating power and effective energy

X ray film like ordinary photographic film, consists of a sensitive emulsion containing silver bromide particles on a gelatine base Under the influence of light or X rays these particles are activated in such a way that they can be reduced to metallic silver by development In their transit through the body some of the X rays are absorbed the amount of absorption depending on the thickness and density of the tissues through which the beam passes It is this partial absorption of the rays by the body which causes the variation in blackening on the film, however the blackening effect of X radiation is poor compared with that of visible light

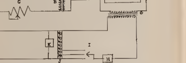


FIG 2.—Diagram of X ray circuit A ammeter B filament transformer C rheostat D tube E cathode F anode G main transformer H time switch I selector kv switch J autotransformer; K voltmeter

Intensifying screens make use of the film's sensitivity to light and are coated with crystals of calcium tungstate which glow when subjected to radiation giving off visible light The film can be put between two of these screens the whole being contained in a light proof casette with a radio translucent front of either bakelite or aluminium It is obvious that to make use of the light or fluorescence from the screens the films must be taken out of their paper wrappings and be in direct contact with the business surfaces of the screens The screens are marked on their outer non coated surfaces back and front the former being thicker than the latter Screens are expensive and should be treated with great care as any dirt or scratch will prevent the fluorescence from that part reaching the film Two common enemies of screens are drops of liquid from developing dishes and cigarette ash and casettes should never be loaded or unloaded with wet hands. For efficient working the screens and film must be in firm contact; this can be maintained only while the casettes are in good condition and they are easily damaged by rough handling. The use of intensifying screens will enable the exposure factors to be reduced by about eight times.

With such an enormous advantage in speed the use of screens must have some drawback; this is loss of definition. The relatively thin parts of the body—the hands, the forearm and elbow, and the foot and ankle—should be X-rayed without screens, the film being in its original envelope. This will produce the maximum of detail. The knee and shoulder can also be taken using envelope-wrapped films but this is not recommended as a routine as it means a large load on the tube, and there will be a loss of definition owing to scatter, about which more later.

While the ordinary films can be used in their envelopes for non-screen techniques, special non-screen films are made for this work. These are "Kodirex" and "Ilfirex" made by Kodak and Ilford respectively. These special films are about twice as fast as ordinary films for non-screen work and thus enable the exposure time to be halved. It is of importance to be sure if one is using the ordinary or the special non-screen film.

Screens are of different speeds, the two grades most commonly in use being the ordinary Ilford tungstate and the fast Kodak super speed. The latter is nearly twice as fast as the former but the definition it gives is not so good. Their use is strongly recommended, however, with a small portable unit as the exposure times can be reduced to almost half, thus increasing the scope of the unit. Whichever type of screen is used one should make sure that they are the same in all casettes and that when fresh screens are drawn they are of the same type, otherwise there will be a great variation in film density when using the same technical factors. The makes of screen are marked on their outer surfaces; if they are stuck into the casettes they can be distinguished as the Kodak screen is whiter than the Ilford and its corners are cut, making a larger arc of a larger circle than the corners of the Ilford screen.

Definition is the clearness with which detail is shown; its opposite is blur. Blurring is of three origins: (1) geometrical, (2) screen, and (3) movement. Of the geometrical factors involved, the most important is the size of the focal spot, the actual source of origin of the radiation on the target of the tube.

The smaller the focal spot the better the definition, and the larger the focal spot the greater the blur. A small focal spot cannot be used always as there is a loading limit per square millimetre of the tungsten target and if this load is exceeded the tube will be damaged. If a large load—a high voltage milliamperage second product—is to be used, the focal spot must be large. As large currents and high voltages cannot be generated on the portable units the tube loads are comparatively small, which enables a fine focal spot to be used, giving excellent definition.

The other important geometrical factor is the distance between the tube and the film. The greater this distance the better the definition, but increasing the focal film distance will increase the exposure time. This varies inversely with the square of the distance, i.e. if the distance is doubled the exposure time must be multiplied by four. A standard working distance of 30 inches is recommended.

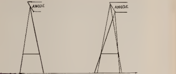


FIG. 3.—Diagram showing sharp image from a point focus and blurring from a linear focus.

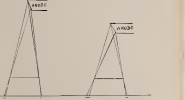


FIG. 4.—Diagram showing increase in blur with decrease of focal film distance.

Another important geometrical factor is the object film distance. The greater this distance the greater the blur and the object should, therefore, be as close to the film as possible.

As stated already, there is loss of definition or blur from the intensifying screens; the faster the screens the greater the blur. This is because the fast screens use large crystals of calcium tungstate which, while producing more light than the smaller crystals of slow screens, also produce greater diffusion of the light.

Any movement of the object which is being X-rayed will cause loss of definition. It is of the greatest importance, therefore, to immobilize the part completely by using sandbags and compression bands and by making the patient comfortable as a whole and keeping him warm.

The two units in most common use in the Service are the Victor (G.E.C.) F 35 and the Cuthbert Andrews' Portex. The former has not only a finer focal spot giving better detail, but also a slightly higher milliamperage output. Like all units they depend on alternating current for the production of the necessary high tension in the transformer, and if no A.C. is available a rotary converter must be used. This is a D.C. motor combined with a dynamo producing A.C., but such conversion causes an appreciable power loss. The converter is noisy, heavy and an extra piece of gear, but where there is only a D.C. supply it is a necessary evil. The transformers of these sets are built into the tube heads, the whole of which is shockproof, and the leads to it carry only low tension current. On the control panel of the Victor is a selector switch with settings marked 1, 2 and 3. These are variations in voltage across the tube, "1" being about 60 kilovolts (60,000 volts), "2" about 65 kv., and "3" about 70 kv. The filament control regulates the milliamperage, which is shown on the meter on the panel. On the Portex there are also three kilovolt stages, marked 58, 65 and 72. The time switch is the only other adjustable instrument.

The rod stands supplied mostly with both of these sets are not easy to manipulate and do not make for quick centring. It will be found easier to position the patient under the centre of the tube rather than the tube over the patient, and a plumb line is essential owing to the difficulty of running the tube up and down the stands. The focal spot is about one inch above the aperture in the tube head and this point should be used for measuring distances.

The technique charts supplied by the manufacturers will be found quite satisfactory, but some alteration will be necessary owing to the "patient variability." In theory the time of exposure should be increased or decreased by one quarter for each centimetre of thickness that the part is greater or less than the average; in actual practice very little variation from the standard is required in radiography of the skull, feet, ankles, hands and elbows. Little variation is required for the knees, pelvis, hips or dorsal spine, though a fair amount is required for the belly. Considerable variation is required for a lateral lumbar spine (a thick man may take double the average exposure) and a good deal of variation is required for chests. Using a 4 ft. 6 in. focal film distance with selector 3 and 15 milliamperes, the average chest will probably require ½ second, the thin chest will require ¼, the above average ¾, the out size 1 second and the extra outsize 1½ seconds. The milliamperage control should be left in one position and adjusted as required during the exposure. Except for chest work, dummy runs to adjust the setting are unnecessary and will only heat up the tube before it commences to do any useful work; it is heat which is the tube's limiting factor and which will destroy it and the filament current should be switched off as soon as the exposure has been made.

One of the difficulties of radiography is how to eliminate scattered radiation. This is secondary radiation equivalent to reflected light which is given off in all directions by matter through which the primary beam is passing. The scatter causes a generalized fogging of the whole film, giving it a flat, dull appearance and tending to eliminate detail. It varies with the following conditions:—

(1) The thickness and density of the part through which the rays have to pass: the thicker and denser the part the more the scatter. There is very little scatter from the hand as it is thin; it is negligible from the chest as this is of low density, but scatter from the belly is considerable as this is both thick and dense.

(2) The size of the field exposed to the radiation: the larger the field the greater the amount of tissue from which scattered radiation can arise.

(3) The quality of the radiation: the higher the tube voltage the greater is the scatter.

It is not practicable, on a portable unit, to try to cut down scatter by using the lower tube voltages as it is the thick parts from which the most scatter will arise, which will require the most penetrating rays and most energy. The thickness of the part cannot be reduced except for the abdomen where, by the use of a compression band—a wide bandage pulled tightly under the table and over the belly—a considerable diminution in girth can often be produced, which not only reduces secondary radiation but also enables the exposure to be cut down. Scatter can be reduced very considerably, however, by keeping the size of the field to an absolute minimum, and this can be done by the use of cones or diaphragms on the tube to restrict the size of the beam. The cone supplied with the Victor is a wide one, covering a field of more than 12 inches in diameter at a 30 inch focal film distance, but this can be reduced by making small lead diaphragms with different sized apertures to fit over the open end of the cone. Another way to reduce the size of the field is by the use of a metal shield over the part to be examined with a small aperture cut out of the middle to allow the required size of beam to pass. A shield with an aperture of 9 inches by 7 inches will, if placed on the belly, cover a 12 inch by 10 inch film. The simplest shield is, of course, made up with lead rubber strips. There is always some back scatter from the table top and this should be eliminated by putting a piece of lead under the envelope wrapped films. Casettes have a lead back in order to cut out this scatter.

The most effective way of eliminating scatter is by the use of a grid made of fine alternating parallel lead and wood strips. Unfortunately these (known as Lysholm or stationary grids) are not a standard issue with the service afloat outfit. The grid lines from the lead strips—60 to the inch—show on the film but they are so fine as to be of little practical disadvantage. The grid is placed between the top of the casette and the patient. If, as is probable, it is used with casettes of a smaller size than its dimensions, wooden frames should be made to surround the casettes and bring the total size up to that of the grid, otherwise the unsupported edges of the grid will bend under the weight of the body and it will be damaged. It is a delicate piece of apparatus and if allowed to buckle is useless. An X ray couch has under the top of the table a built in grid which moves at right angles to the direction of the strips during the exposure and so fades out the lines from showing on the film. Using a grid, either stationary or moving, increases the exposure by three times. When using it care should be taken that the correct side is towards the tube, that the grid is at right angles to the central ray and not tilted from side to side, and that the centre of the grid is under the centre of the beam.

It is not proposed to describe all the standard radiographic positions in this paper. This is done very simply in an admirable little book "Standard

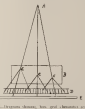


Fig. 3.—Diagram showing how grid eliminates scattered secondary radiation. A source of primary radiation. B body. C points of secondary radiation. D grid. E cassette.

Radiographic Positions" by Davies and Isenburgh which costs six shillings—less than three 12 inch by 10 inch films. In radiographing joints it is of the utmost importance that the central ray passes through the joint space. Mark the line of the joint in pencil or ink on the skin and then arrange the patient so that the centre of the film is beneath this and the middle of the aperture of the tube is directly above. It is essential, of course, that the tube head is not tilted. When radiographing part of a limb use a film long enough to include the nearest joint so that if a lesion is found its position can be localized.

A position is referred to as anterior posterior, or A P, when its anterior surface is towards the tube and its posterior towards the film, and similarly as P A when the part is reversed; a right lateral has the right side of the body against the film As said before the feet hands and elbows should be taken with non screen films The standard views for the hand are P A (with the palm down) and an oblique at 45 degrees with the palm down and the ulnar side of the hand on the film The hand will not stay still in this position unless it is immobilized a good way is to support the tips of the forefinger and thumb by the forefinger and thumb of the other hand and a sandbag should be placed over the wrist For a single finger a lateral view should be taken with the finger and film on the edge of the table For injuries of the lower end of the radius take a P A and a lateral For the scaphoid take the P A with the hand in ulnar deviation a lateral and a 45 degrees oblique with the ulnar side on the film and the palm down the scaphoid is under the anatomical snuffbox and it is this level of the wrist which should be under the central ray

The forearm should be examined when possible with both the wrist and elbow joints simultaneously in the A P position and with both joints simultaneously in the lateral position This is not so easy as may be thought and can be done only by getting the arm as well as the forearm flat on the table with the shoulder down to the same level The elbow joint is an inch below the epicondyles of the humerus

The foot is examined in the A P and oblique positions For the A P the tube should be tilted about 15 degrees towards the ankle with the central ray directed on to the base of the third metatarsal The oblique view is taken with the patient on the affected side with the little toe on the film Happily with the patient lying on his side the foot takes up a natural oblique position and the ankle is in the true lateral position The other foot should be swung forward out of the way For a lateral view of the knee the patient should lie on the affected side with the other leg moved forward Always immobilize the limb with sandbags both above and below the joints

It is surprising the amount of chest which with careful technique can be covered by a 12 inch by 10 inch film If the chest is narrow the casette should be used up and down if the patient is average in size or above the casette should be placed with the long edge across one film being used for the upper chest and a second for the bases if necessary Effusions are almost always in the lower chest and pneumonias generally so but tuberculous lesions in more than nine cases out of ten start in the upper chest generally below the clavicles Without a chest stand the easiest procedure is for the patient to stand or sit sideways on a chair facing a wall with his arms folded around the casette Unless aiming deliberately at the lower chest the head should be flexed over the upper edge of the casette which can be grasped firmly between the chin and the neck The upper edge should be level with the top of the shoulders as seen from behind and these should be depressed as much as possible and brought well forward so as to clear the scapulae from the lung fields The patient should lean forward so that the top of the head and the back of his hands and wrists are touching the wall Have the casette as near vertical as possible and as a starting technique try 15 ma and ½ second at 4 feet 6 inches The exposure should be made in full inspiration

For suspected fractures of the spine except for the very occasional injury to the lumbar transverse processes the A P view will provide little information the lateral view being that of value Take the lateral views of the spine first before the tube and the operator get hot The lateral cervical is best taken with the patient lying on his back with the shoulders pulled well down and the casette outside the shoulders but parallel to the spine A 4 feet 6 inches F F D should be used as a starting technique try two seconds on the top kilovoltage stud If the patient cannot be turned because of injury the lateral views of the dorsal and lumbar spine also can be taken from the side with the patient on his back The A P dorsal lateral dorsal and A P lumbar all require about the same exposure with the tube at 30 inches these should be about 3 seconds on the top kv stud The dorsals should be taken in full inspiration and the A P lumbar in expiration as the thickness of the belly is then less for the lateral lumbar allow the patient to continue breathing gently Reduce the milliamperes to 10 and give an 8 second exposure

If a part is in plaster of Paris the exposure time must be doubled or more if the plaster is unusually thick if it is wet the time must be multiplied by three Plaster will obscure bone detail and so there is no point in using envelope-wrapped films use casettes and save the tube

And now after all this the film must be processed It is possible sometimes to produce films of good enough diagnostic quality in spite of faulty factors and bad positioning but with bad dark-room technique even though the exposure factors are correct and the positioning perfect failure is inevitable The dark room must be absolutely light proof—even to the accommodated eye there must be no leaks There must be somewhere clean and dry for loading and unloading the casettes and the developer must be fresh prepared according to the manufacturer s directions and at the correct temperature (which should be 65° F) In these circumstances the film will require five minutes for development A clip on one corner is a great help with its manipulation in the dishes See that the whole film is covered evenly on its immersion into the developer, keep it gently on the move with the clip and rock the whole tray from time to time After five minutes by the clock give the film a rinse and then put it into the fixer Here it is not important to keep it on the move continuously but it should be agitated from time to time Keep it in the fixer until it is clear and then as long again If the temperature of the developer is not exactly 65° F the following adjustments in the developing time should be made —

61°	6¼ minutes	66°	4½ minutes
63°	5¾ minutes	68°	4 minutes
65°	5 minutes	70°	3½ minutes

Never develop with the temperature of the developer under 60° F or over 70° F and it is best for the fixer and rinsing water to be as near 65° F as possible The washing bath should be under 75° F as above this temperature the emulsion will melt from the film

Have the safe light on the ceiling and turn it off while the film is in the developer The white light can be put on when the film is in the fixer Do not have a safe light over or in front of the developing dishes for you may then be tempted to take the film out of the developer before the five minutes is up to have a look to see how it is getting on—this will not give any useful information and may fog the film and may also drip some developer into the fixer. The glow from a cigarette does not fog the film and provides useful illumination when working with a safe light, but the ash does not improve the developer and is definitely harmful to the screens. The developer not only becomes exhausted with use but will oxidize on standing, and it is recommended therefore that it should not be kept made up for more than a week, during which time it should be in a light proof bottle.

What of screening? My advice, like that of Mr Punch to those about to marry, is "Don't". The amount of screening required for the setting of fractures varies inversely with the ability of the surgeon. If it must be done use a lead diaphragm over the open end of the cone to confine the circle of fluorescence to the screen. Screening of chests is hazardous to the extreme as it is impossible to move the tube and screen together to survey different areas; also the interpretation of screen examination of the chest requires very considerable experience.

The limiting factor of these units should be the ability to interpret the results. Any lesion in the limbs should be demonstrated. First class dental films can be produced. It should be possible to show most fractures and displacements of the spine and ribs. Adequate films of the sinuses and mandible should be produced. In the abdomen, renal calculi will not be shown with any certainty unless a grid is used to cut down scattered radiation. With a perforated peptic ulcer gas under the diaphragm should be demonstrated without difficulty, but the patient must be sitting up. Although in the chest very small lesions may be demonstrated, it is often not possible to say that the chest is normal. An exposure sufficiently short to eliminate the movement of the pulsating vessels may be required, and this is quite beyond the scope of a portable unit. It must be remembered that the chest, joints and other parts as well, although radiologically normal one day, may show marked pathological change a few weeks or even a few days later.

The most frequent source of trouble by a long way is the improper management of the screens. They may be put into the casette the wrong way round, or the film may not be between them or still in its wrapping. A common cause of inconstant results is the use of screens and films of different speeds. It is said that films will fog gradually if kept for any length of time in the casettes and therefore these should not be kept loaded unless in frequent use. Distrust the expert who professes to be able to tell if a film is developed sufficiently by viewing it against a safe light—he is almost certainly "shooting a line".

The reproductions below are of skiagrams, all of which were taken with a Victor F-35.

Both the cervical and dorsal spine were taken with the patient lying on his back.

Of the two films of the fifth lumbar vertebra, (a) was taken using only a

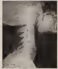


Fig. 6 (a) [illegible]

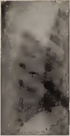
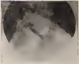


Fig. 6 (b) Dors[illegible]



[illegible]

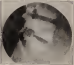


Fig. 7 (b)

small [illegible] while (b) was taken with a cone and a moving grid. The film of the same patient, taken with an open cone and without a graf produced a skiagram of such poor quality that reproduction was impossible. This shows clearly what can be done to eliminate [illegible] nothing else except a cone which can be made by any blacksmith.

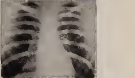


FIG. 8 (a)

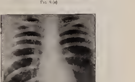


FIG. 8 (b)

The two chest films were of the same patient: one (a) was taken using a Victor F 33 ma. [illegible] and the other (b) was taken using a rotating anode tube with an exposure of 1/20 seconds with 100 ma. The difference between the prints of these films is negligible. Both were taken on 12 inch by 10 inch films at 5 feet F F D and the whole chest except the costophrenic angles is included. The patient was of average size, 5 ft. 8 in. tall and weighing 154 lb.

ACUTE MENTAL ILLNESS AT SEA—
A STUDY OF 50 CASES

BY

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INTRODUCTION

Among emergencies at sea, acute mental illness has a unique place. A medical or surgical disaster calls for extreme exertion by the doctor, but the patient is nearly always to some extent co-operative and there is rarely any doubt in his own mind and those of his shipmates that he is ill. In addition, doctors are usually familiar with such conditions.

Psychiatric emergencies are distinguished by their inconvenience, their unfamiliarity, their danger to both the sick man and his ship since he may continue at work whilst suffering from delusions and hallucinations and act in accordance with them and not with reality, and their danger to morale. This can happen in at least two ways—the patient may be in authority and act irresponsibly, or may be punished for some misbehaviour and his illness being discovered later bring discredit upon naval justice and medicine.

The psychotic, unlike the neurotic, often fails to enlist the sympathy of his messmates because his lack of contact with them, his indifference to his surroundings and his shut in self centred life make it unlikely that any change in his behaviour will be remarked upon except, perhaps, as an additional oddity; in this way the early signs of acute illness are missed. Because of his lack of insight the chances of discovery are further reduced; the patient does not help the examiner and doctors sometimes resent such an attitude and help is withheld or delayed when needed most.

To assist those who have to deal with these problems 50 cases have been selected which were admitted consecutively from sea going ships to hospitals in Malta. An attempt has been made to indicate roughly the variety and distribution of acute mental illnesses which may occur on board and to facilitate diagnosis by showing some of the difficulties that arise. It is impossible, unfortunately, to give even a rough guess at the number of men from which these cases were derived—there has been so much movement of shipping in the Mediterranean during the last eighteen months that it is doubtful if an accurate estimate could be made.

In fifteen months in an escort vessel on Western Approaches in the late war, the writer had two schizophrenic reactive patients on board, both of whom were fortunately removed from the ship before going to sea. In a visit to a Commodore's ship in a convoy—where the Commodore himself was ill with post influenzal depression complicating otitis media—one of the seamen had [illegible] quently and had [illegible] the [illegible]. The opportunity for diagnosis was lost because he disappeared over the side before he could be interviewed. In the same period there were two abdominal emergencies. From these observations and from discussions with other medical officers it seems that acute mental illness at sea occurs frequently enough to be given some attention.

Where accounts of these cases may seem unfavourable to the clinical acumen of the medical officers concerned it must be remembered that they were dealing with unfamiliar illnesses under trying and difficult conditions, often without either skilled assistance or suitable drugs. This is not written to disparage the work of sea-going doctors from the shelter of a shore base but for those who attempt to practise Bismarck's difficult advice: "Fools say they learn by experience, but I prefer to learn by other people's experience."

The Material

Of the 50 cases tabulated below 44 were from the Royal Navy, the others being composed of 1 Royal Air Force personnel, 3 Army and 2 Merchant Navy. All were admitted from sea-going ships, with the exception of one case (No. X in the case records) who had been on shore for several weeks, but, because he was undoubtedly at sea when symptoms developed, he has been included. All but four cases were admitted to the observation ward, 90th Military Hospital; these four cases were treated at R.N. Hospital, Malta, and consisted of two schizophrenics and two psychopathic constitutional inferiors. One schizophrenic was an instance of mild paraphrenia in a medical officer; the other, a hebephrenic, was so badly injured that he could not be moved (Case II). The two psychopaths were fairly well behaved once they were removed to a favourable environment from their ships.

Twenty men were involved in disciplinary trouble: 8 of 9 psychopaths, 6 schizophrenics and 6 of the rest; this ranged from simple drunkenness to attempted murder. 14 men had been drunken, and in 3 schizophrenics it seems to have been the first sign of psychosis noticed by their shipmates. In five men, three of them hysterics, drink precipitated alarming dissociative episodes which resulted in their admission. 11 had attempted suicide but only one—the schizophrenic referred to above—was nearly successful, and 3 psychopaths made feeble attempts to poison themselves. At least four supposed suicide attempts were abreactions of battle or other emotional disasters facilitated by alcohol, which so confused the observers that they were unable to decide what was taking place. 36 were invalided and 14 returned to duty, one of these being made unsuitable for further service later and another dismissed the Service and sentenced to two years' imprisonment.

The Cases

An attempt has been made here to give typical examples of the illnesses seen, with special reference to early symptoms and diagnosis.

TABLE I.—[illegible] DIFFERENT [illegible] AGE [illegible]

Illness	Under 20 years	20–25 years	25–30 years	30–40 years	Over 40 years	Totals
Psychopathic personality	2	5	1	1	—	9
Schizophrenia	6	8	2	1	—	17
Depression	—	1	1	[illegible]	—	5
General paralysis	—	—		1	1	2
Head injury sequelæ	—	—	1	1	—	[illegible]
Hysteria	—	1	—	[illegible]	1	3
Toxic confusional state	1	3	—	1	—	5
Adult maladjustment	—	—	1	—	—	1
Anxiety depression	1	2	[illegible]	—	—	5
Cerebral tumour	—	—	1	—	—	1
Totals	10	21	[illegible]	[illegible]	[illegible]	50

TABLE II.—AGE INCIDENCE OF SCHIZOPHRENIA COMPARED WITH OTHER ILLNESSES

Illness	Under 20 years	20–25 years	25–30 years	30–40 years	Over 40 years	Totals
Schizophrenia	6	8	2	1	—	17
All other cases	4	13	7	7	[illegible]	33

TABLE III.—AGE INCIDENCE OF SCHIZOPHRENIA AND PSYCHOPATHIC PERSONALITY COMPARED WITH OTHER ILLNESSES

Illness	Under 20 years	20–25 years	25–30 years	30–40 years	Over 40 years	Totals
Schizophrenia and psychopathic personality	8	13	3	2	—	26
All other cases	2	8	6	6	2	24

SCHIZOPHRENIC REACTIONS

Case I.—Midshipman, age 19.

The patient was admitted from [illegible] steamer returning home from the Far East. For [illegible] then [illegible] brought prior to his admission his conduct had given rise to some [illegible] when he began to discuss the problems of life with all and sundry on the [illegible]. On occasions he had ordered a 30 [illegible] [illegible] watch for no obvious [illegible]. He had asked to be allowed to live in the Petty Officers' Mess because he thought that he was a [illegible] officer. On the day before admission he had opened the ship's [illegible] and torn up two Maltese pound notes which he found there in the [illegible], and he had spoken of his sexual experiences. However, in spite of all this he was not apparently considered ill enough to be sent ashore until the naval medical transport officer who came to board the ship noticed him walking up and down the deck with his [illegible] patches torn off and, remarking upon his strange behaviour, advised his immediate removal to hospital.

When first seen he was restless, aggressive, overactive, uncooperative and showed [illegible] flight of ideas. It appeared later that he had been [illegible] and [illegible]. Although it was clear that he was grossly ill it was not easy to diagnose his condition at first, but after a provisional diagnosis of simple mania this was later altered to schizophrenia.

This case shows the degree of tolerance with which eccentric behaviour can be viewed by those who have become accustomed to it. There was a medical officer in the ship.

Case II.—Ordinary Seaman, age 19.

Following a suicidal attempt in which he tried to throw himself down the funnel of his ship, the patient was admitted from a cruiser to the surgical ward with grave injuries. Very little history could be obtained, but it seemed that for some time he had been [illegible] and [illegible]. He was a youth with a brilliant school record [illegible] evidence of thought disorder and lack of correspondence [illegible]. He was negativistic and showed many other features of regr[illegible], tic and tongue sucking. He complained of lack of true feeling and had nihilistic delusions of spiritual death.

It is possible that a better liaison between the ship's padre—who knew him quite well—and the medical officer might have avoided the serious injuries which complicated his treatment and prognosis.

A later report from a Royal Naval auxiliary hospital in the United Kingdom confirmed the diagnosis of hebephrenic schizophrenia.

Case III.—Leading Seaman, aged 20.

First seen as an out-patient, having been brought to the hospital by his medical officer and coxswain, there was some doubt whether this patient was malingering or not. He was dirty, unshaven, tousled, distractable and overactive. He wandered about the consulting room talking incessantly, and it appeared that he was disorientated for time and place. He had delusions of injury to his eyes, testicles and spine. His illness had started with a minor disciplinary incident about a week before admission and afterwards he became suspicious and aggressive and complained of bizarre pains. For four days he was treated in the sick bay with an initial dose of ¼ grain omnopon followed by small quantities of phenobarbitone.

His medical officer, unable to understand his strange behaviour, felt that he must be malingering. In retrospect it appears that he was at that time hallucinated and deluded. The schizophrenic nature of this episode was plain enough but it might not have been easy to diagnose in the acute phase. However, there should never have been much doubt that he was suffering from a grave mental illness.

DEPRESSIVE STATE

Case IV.—Private, aged 37.

This patient was returning to the United Kingdom by troopship for demobilization. Shortly after coming on board he attracted attention by asking whether he could leave the ship and appearing agitated. He was extremely restless and had bitten his finger nails almost completely away, and his sole subject of conversation was the repeated [illegible] that he had everything to live for. [illegible] the psychiatrist to the Levant Station was taking passage in the ship the patient was diagnosed as a cyclothymic depression and segregated immediately, heavily sedated and full suicidal precautions taken from the moment he was first seen. He was given a sedative an hour before being removed from the ship in a Neil Robertson stretcher.

This could well serve as a model of how such cases should be treated at sea.

HYSTERIA

Case V.—Petty Officer Welder, aged 40.

The patient began to feel shaky after a long session of welding on a tricky job on his ship; he became increasingly uneasy and was eventually discovered in a wash place shouting, "Give me back my boys." This occurred on at least two other occasions.

He was admitted to hospital after one of these incidents and was treated with hypo-analysis, which uncovered a long history of family difficulties culminating in the loss of his two children in the Glasgow blitz while his wife was [illegible]. His hysterical dissociation showed clearly the meaningful nature of such an episode and also how quickly it secures help and attention compared with more [illegible] psychotic reactions.

PSYCHOPATHIC PERSONALITY

Case VI.—Able Seaman, aged 23.

This patient was admitted on a Neil Robertson stretcher and wearing handcuffs and footcuffs. About two-and-a-half hours before admission he had run round the group of minesweepers which were moored alongside, brandishing a hammer and a knife. In this wild outburst he had struck a senior officer on the head. When seen [illegible] that he was quite coherent. It transpired that [illegible] drink on an almost empty stomach in the [illegible] and he could remember nothing of the incident [illegible] clear that he could remember it well enough. He was [illegible] at the time this episode was awaiting a decision [illegible] Services [illegible] required because of his instability and general [illegible] of detention. He had told the psychiatrist that he [illegible] leave [illegible] rather [illegible] in this medical [illegible]. The [illegible] officer [illegible] circumstances [illegible] of this [illegible] drink [illegible] psychopathic [illegible] this [illegible].

[illegible] control [illegible] on board but although he struck his commanding [illegible] the damage done was minimal though much furniture [illegible] this case it is not difficult when his history was taken into [illegible] the difficult question of responsibility arose—he received [illegible] striking a superior officer.

ORGANIC PSYCHOSES

[illegible] State

[illegible] aged 20

[illegible] was admitted from [illegible] when he had been [illegible] and had [illegible] pain in the left chest [illegible]. In the evening he suddenly [illegible] forward and threw himself [illegible] table laid for supper [illegible] whilst lying on his back [illegible] conscious of his heart [illegible] the [illegible] appeared to change colour and he [illegible] that people were [illegible] the next. He was [illegible] what was about to happen and that [illegible].

[illegible] in the ward and his state [illegible] subsided.

[illegible] state precipitating [illegible] in a youth [illegible] traits, his symptoms [illegible] as his physical illness [illegible] hallucinations combined with intense fear are typical [illegible].

[illegible] State

[illegible] Leading Seaman aged 30

[illegible] was admitted from a battleship where he was considered to be an anxiety [illegible] domestic worry. He was very long winded and circumstantial and [illegible] his domestic affairs. It appeared that his medical officer and [illegible] their attention upon this aspect of his trouble to the exclusion of all else [illegible] his previous medical history revealed that he was admitted to R.N. [illegible] fractured base of skull [illegible] years previously; his consciousness had [illegible] days and the third, seventh and eighth nerves were involved. [illegible] had been increasingly susceptible to alcohol and this, combined with [illegible] irritability, defects of recent memory and complete lack of insight, had [illegible] responsible for his domestic trouble. In his ship he had difficulty in [illegible] the gunnery manual and in applying it to unfamiliar conditions.

[illegible] return to England he was sent to R.N.A.H. Cholmondeley Castle but he failed [illegible] and had to be invalided from the Service. He showed a change of [illegible] and memory impairment of an organic type following severe head injury [illegible] prognosis appeared unfavourable. In this case preoccupation with his supposed [illegible] was allowed to obscure the signs of organic mental disease.

General Paralysis of the Insane

Case IX.—Petty Officer aged 35

This patient was admitted from a minesweeper which he had joined recently. In that ship his boastful and aggressive behaviour had drawn some unfavourable attention [illegible] a change [illegible] after being [illegible] began [illegible] months. He [illegible] medical [illegible] reported immediately [illegible]

[illegible]

[illegible]

Cerebral Tumour

Case X.—[illegible]

[illegible]

[illegible]

[illegible]

DIAGNOSIS

The problem of early diagnosis is very important in a ship where harm can easily befall the patient and his companions if he continues on duty in a disturbed state of mind, perhaps distressed by delusions and hallucinations. It is not intended to discuss psychiatric diagnosis in general, but only a few special points which arise from this group of cases. It is unfortunately the early and acute stages of mental illness in which most medical officers have little personal experience, for such cases are seen but rarely at teaching hospitals. This is offset to some extent by the limitations of age and sex in H.M. ships, whose complements are composed almost entirely of men between the ages of 18 and 40.

The organic reaction types (men with physical illnesses) composed one fifth of the total: 4 had severe diseases (1 cerebral tumour, 3 general paralytics and 1 pulmonary tubercle), 2 had acute febrile illnesses, 2 sequelæ of head injury and 2 alcoholic intoxications. Apart from the alcoholics none of these cases was diagnosed correctly. It is true that laboratory tests were necessary to confirm the clinical findings, but a full and careful history, followed by physical examination, would have strongly suggested the presence of an organic illness. It seems that the appearance of supposedly psychogenic symptoms tends to reduce the ardour of the examiner and even sometimes removes the obligation of taking a history—Case X showed an unfortunate example of this.

Acute organic psychoses are characterized by rapidly changing visual, auditory or tactile hallucinations or misrepresentations, clouding of consciousness, evidence of disordered intellect or excited and fearful mood, and signs of the precipitating physical illness are usually present. The chronic organic psychoses are especially liable to be accompanied by deterioration of intellect, failure of recent memory being very common, and as a compensation for or reaction to this, fabrications and mood changes.

Some patients were suspected of malingering—a diagnosis which should be made with great reserve. The writer has seen one certain case in nearly four years and a very experienced naval doctor remembers only six in over twenty years. Brigadier J. R. Rees, noting its rarity, mentions its frequent association with low intelligence. It need be confused but seldom with acute mental illness and it is undoubtedly better to miss the occasional malingerer than to be so preoccupied with the problem of detecting him that a sick man suffers.

Drunkenness is frequently a complication and sometimes alone—apparent lack of opportunity does not exclude it. A seaman was seen in the out-patient department recently who had secured illicitly a large quantity of "gash" communion wine and, feeling low spirited, had held a long and lonely drinking session which ended in his running amuck. He was thought to be "mental" but was only dull, unhappy and drunk. Drink can complicate neuroses, psychoses or psychopathic personality; dissociative states precipitated by alcohol were mentioned earlier and quite small quantities are sufficient to produce such a state. The circumscribed nature of these incidents, combined with the psychoneurosis which is detectable usually on brief examination, are useful pointers. *Psychopathic personalities* often become savage or aggressive with drink and, as in Case VI, may run amuck and do considerable damage. These men may then allege an amnesia for any assault they may have committed or damage done, but if seen fairly soon afterwards they can usually be persuaded to remember what happened. In addition to this, psychopaths have brief illnesses which can be distinguished only by their reactivity and transience from psychoses, and they tend to improve quickly when circumstances change for the better.

The schizophrenic illnesses are mainly in the "under 25" age group and usually in men with a fairly short period of service. They are rarely diagnosed correctly—hysteria, anxiety state, depression and sometimes malingering being frequent choices. If drunkenness and toxic confusional states are excluded, an acute mental illness of psychotic depth in a young man under the age of 25 who has had a good disciplinary record is more likely to be schizophrenic than anything else. By careful and sympathetic questioning and listening to the patient's conversation, evidence of disordered thought and mood and incongruity between feeling and thinking can usually be found. It is very useful to have some idea of the nature of a patient's delusions and hallucinations or bizarre remarks and actions which might [illegible] his fears and suspicions can be avoided and the danger of violence to himself and others reduced.

The affective psychoses (manic and depressive states) are less frequent than the schizophrenic, and are usually seen in older men. Diagnosis is especially important because suicide attempts must be anticipated and it is often possible to get a patient to discuss his self-destructive thoughts long before he decides to do the deed. Depressive illnesses often present as physical complaints so that persistent hypochondriasis, low spiritedness and some slowing of speech and ideation should always raise the question of an early affective psychosis. As in all other illness it is only by taking a detailed and careful history that a true picture of the illness can be obtained. Mania in its early stages is frequently the cause of disciplinary action: cheerful, restless, tireless and energetic, these patients can cause much trouble unless the true nature of their interfering ebullience is spotted quickly. Suicide threats should of course always be taken seriously.

The psychoneuroses are distinguished by good preservation of personality and even where dissociative episodes such as fugue stages take place there is little doubt in the examiner's mind that he is dealing with a normal person who is faced with unusual internal or external difficulties.

TREATMENT

It may be asked why treatment in a ship should be different from treatment anywhere else but, apart from the few medical officers having any experience with acute mental illnesses, conditions on board ship are very different from those ashore. It is often necessary to nurse an ill and unco-operative man for several days in unsuitable surroundings; in civil life this phase of the disease is usually treated in a mental hospital where special equipment, suitable drugs and highly skilled staff are available. For use at sea, treatment must be simple, effective and safe.

A very large range of drugs is available, from those such as hyoscine (which has been prescribed since antiquity) to the most recently synthesized barbiturate. Textbooks are catholic in their choice and psychiatrists have their favourite treatments, but while this is excellent in a hospital those with little experience require fairly dogmatic advice, especially in emergencies. A scheme has been devised therefore, with the help of Dr. P. Cassar, D.P.M., of the Hospital for Mental Diseases, Malta, in which only one drug is used. Additional drugs will be noted but few details given since they can be found in any standard textbook.

Sodium amytal has been added to the service afloat scale lately in small quantities. This is a most reliable hypnotic; it is easily stored, does not deteriorate readily, has a wide range of safety, and can be given by both oral and parenteral routes. Until 1945 few ships carried adequate supplies of sedatives suitable for psychiatric cases and many ships went to the Far East without any modern quick-acting barbiturates, relying, apparently, on phenobarbitone and bromide. Case III was given gr. ii phenobarbitone t.d.s.

In the early stage of an acute psychosis, this was ineffectual and probably served only to increase his distress by making him feel confused and "dopey".

Mild Cases.—If after he has seen a disturbed patient there is any doubt in the doctor's mind about what to do next he should prescribe 6 to 9 grains of sodium amytal orally and a sleep in the sick bay. This gives time to think about the case and to find out more about the patient from his officers, Petty Officers and messmates. When he awakens a discussion will usually decide whether he should remain sick or not. It seems unlikely that this would prevent a serious illness from developing but it would reduce the patient's excitement and distress for, as Suttie has pointed out, much of the disturbance which a patient shows in a psychosis is a reaction to the unfavourable attitude others adopt towards him. Pinel and Tuke showed many years ago how well the mentally ill would respond to changes in the attitude of those around them. It is therefore essential to maintain a friendly and uncritical attitude during interviews, allowing the patient to do most of the talking. However, one does not always see the case as early as this and is then presented with an excited, agitated, suspicious and sometimes aggressive man. Again the doctor's attitude must be calm and helpful and unless the patient is actively suicidal or murderous (rare contingencies) it should be possible to persuade him to come to the sick bay where 12 grains of sodium amytal removed from the capsules and dissolved in warm water with whisky, brandy or rum added should be ready, this to be taken at one draught. With a little "blarney" most patients, even suspicious ones, will take it if presented as a tonic drink or "pick-me-up". A big, very active or heavy drinking man can have this dose increased to 15 grains but this is seldom needed.

Severe Cases.—In those rare cases when physical force is required three or four strong and steady men should be selected to help, a Neil Robertson stretcher and blankets obtained, and a 10 c.c. syringe loaded with 10 per cent sodium amytal or evipan prepared (pentothal can be used if the other drugs are not available but it is not suitable for intramuscular injection). The doctor should try to persuade the patient to come along to the sick bay but if this fails force must be used. On those very rare occasions when a man becomes violent and dangerous there may be some difficulty in securing him without likelihood of injury to himself or those trying to disarm him. One of the most effective and humane methods is to use a fire hose at moderate pressure, and this is worth remembering when such an emergency arises. Such a manœuvre could be rehearsed during first aid drills to discover the best pressure at which to use the jet.

The first move is to disarm the patient and then remove his boots; while he is held firmly the sedative is injected intravenously at the rate of 1 c.c. a minute until unconsciousness supervenes and the residual liquid is then given intramuscularly. No more than 15 grains should be given at one time but in big and restless patients this can be repeated in one to two hours if proper precautions are taken. The patient is then removed to the sick bay and put in a low bunk with a firm top sheet, constant supervision is maintained and heavy sedation continued orally.

The tendency with sedation is to be far too timid [illegible] provided that one is careful and the drugs and instruments mentioned before are kept ready there is no reason why sixteen to eighteen hours sleep a day should not be maintained for a week or more. Sleep, four hourly pulse, respiration, temperature and fluid intake and output charts should be started immediately. The exact amount of sedative required depends upon the patient but in many cases six grains four hourly orally will produce a deep sleep for over sixteen hours a day. A butterfly shaped piece of cotton wool stuck on the upper lip with the "wings" over the mouth and nostrils helps the nurse to see that breathing is satisfactory.

Diet should be light but appetizing and at least 60 ounces of fluids with glucose must be taken in the twenty four hours. When food is refused feeding by nasal tube should be resorted to, this prospect often being enough to secure better co-operation. The passage of a nasal tube should always be followed by aspiration and the fluid drawn off tested with litmus paper to make sure that it is acid gastric juice; a second safeguard is to pass a little water through before the feed, when, if the tube is in a bronchus, there will be violent coughing; and a third to introduce air by syringe through the nasal tube and listen over the gastric area with a stethoscope. A suitable feed consists of 30 ounces milk, 2 eggs, 1 ounce sugar, 1 ounce Horlicks and one teaspoonful of Marmite in alternate feeds. The juice of one orange should be given separately and also suitable high potency doses of vitamin concentrates in solution or suspension, especially vitamins of the B complex. An enema should be given once the patient is settled and repeated every other day.

Dangers.—The main dangers are allergic reactions to barbiturates, respiratory failure, cardiac failure and respiratory infection.

I have seen no allergic reactions with sodium amytal but they doubtless occur, necessitating a change to another drug.

Respiratory failure can be guarded against by the "butterfly" device which has been mentioned already and where it is suspected the dose must be reduced, oxygen and CO_2 given by B.L.B. mask or [illegible], and in serious cases lumbar puncture and artificial respiration undertaken, preceded by 10 c.c. cardiazol intravenously given slowly.

Cardiac failure is relieved by blocking the foot of the bed, the administration of a stimulant such as cardiazol, and reduced dosage. With sodium amytal both these conditions are rare.

Minor respiratory infections are seen fairly often and can be avoided by breathing exercises when the patient is awake. More serious chest illness is treated in the accepted way.

Sodium amytal should not be stopped suddenly but the dosage reduced gradually, as fits have been reported where this has not been done.

In spite of this list of dangers it is still most likely that too little rather than too much of this drug will be given.

Other Drugs.—Schemes for using these and details of dosage, dangers, &c., can be found in most textbooks.

Hyoscine up to 1/100 grain can be given subcutaneously, alone or combined with morphine and other drugs. It is not entirely safe and in certain individuals produces a state of excitement and confusion as disturbing as the psychosis.

Morphine has a limited use in emergencies.

Paraldehyde is an old and reliable drug; it can be given in 1½ to 2 c.c. doses to a total of 12 c.c. during twenty four hours. It is best made up as must. paraldehyde. Its vile taste and the fact that it is not always stable in hot climates are disadvantages; before the advent of the barbiturates it was one of the best drugs available.

Phenobarbitone should always be crushed before administration as it is compressed so hard frequently that it is probably not dissolved. It acts slowly and is excreted slowly and it is therefore unlikely to be of any help in calming a very excited patient quickly. Somnifaine is another barbiturate with a slow, prolonged action which is fairly safe and is frequently combined with a quickly acting drug.

Bromides have the same disadvantages as phenobarbitone, with the additional danger of bromism.

There are other quick acting barbiturates such as seconal and oral evipan which are undoubtedly useful, but none is as easily administered, effective, safe and as readily obtainable for both oral and parenteral administration as sodium amytal.

Staff.—It must be remembered that some sick berth staff are unacquainted with mental illness and may believe that the patient is malingering. They should have the situation made clear early on so that they understand the patient is gravely ill and that anti social or violent behaviour must not be considered as wilful naughtiness to be met with retaliation but treated kindly and firmly. Even grossly deluded men respond surprisingly well when such an attitude is adopted and are much less troublesome than if they are bullied and threatened.

Transfer to Shore.—When harbour is reached the medical officer is naturally keen to be rid of a difficult patient, but before this is done proper precautions must be made since a deluded or hallucinated man takes sudden moving badly because he is liable to make bizarre misinterpretations of the situation and become stubborn and fractious in consequence. Moving should be preceded by heavy sedation. At an out patient department lately a harassed medical officer and sick berth attendant were seen trailing around with an excited and grossly deluded schizophrenic to the detriment of all. Whenever there is doubt about how the patient will behave, 6 to 9 grains of sodium amytal dissolved in water should be given half an hour before taking him ashore in a Neil Robertson stretcher with an escort. Where the patient is quieter sedation alone is sufficient provided that he has a friendly relationship with those who are to accompany him ashore.

The medical officer should contact the hospital to which the patient is to be sent and should, if possible, be at that hospital before the patient arrives with his escort. When this is done the patient is taken direct to the observation ward; otherwise officious underlings may cause delays and questionings which make the patient irritable, suspicious and disgruntled. A provisional diagnosis is helpful at this stage because it is much [illegible] the psychiatrist to prepare for his [illegible] if he has some idea what is the [illegible]

Documents.—It is essential that a full medical history and an executive report (in accordance with C.A.F.O. 144/42) should accompany the patient. He is frequently incapable of giving a coherent account of himself, and even where he is it is often distorted by delusions and misinterpretations and, therefore, most detailed notes about the genesis of his illness should be made. Officers, Petty Officers and messmates should be questioned closely and their impressions of the patient recorded. Disciplinary trouble or welfare reports are other valuable sources of information.

DISCUSSION

While acute mental illnesses occur fairly frequently at sea, they are not seen often enough for the individual medical officer to become familiar with their treatment and he is usually caught unprepared. This makes his task difficult because the earlier and more vigorously such illnesses are treated the easier they are to treat, but if the sick man's abnormal activities are received unfavourably and without understanding he reacts by becoming increasingly anti-social. Once a vicious circle of this sort is established it may be very hard to break. It is suggested, therefore, that those who have only a limited experience of mental illness should adopt a standard treatment which combines efficiency with a wide margin of safety. In order to be ready for such an emergency it would be wise to have half a dozen ampoules of sodium amytal and at least 100 3 gram capsules in a special pack to be kept ready with other first aid kit. In order to employ the treatment outlined with most advantage early diagnosis is necessary. By ensuring a close liaison with the executive officers and the padre it should be possible to detect unstable men who are potential patients and keep them under supervision. In this way breakdowns at sea can be prevented or at least mitigated.

SUMMARY

Fifty cases of acute mental illness arising at sea in ships on this station are described and classified. Problems arising from the diagnosis and treatment of these patients are discussed and a method of heavy sedation using a single drug (sodium amytal) by both oral and parenteral routes recommended. Possible dangers arising with the use of sodium amytal are noted and precautions advised. It is suggested that a special pack should be carried in ships for the emergency treatment of mental illness.

ACKNOWLEDGMENTS

I am indebted to Surgeon Captain W. H. Murray, R.N., Medical Officer in Charge, R.N. Hospital, Malta, and Colonel L. Holmes, Officer Commanding 90th Military Hospital, Malta, for permission to record cases seen at their hospitals; to Dr. Paul Cassar, D.P.M., of the Hospital for Mental Diseases, Malta, for advice and help on the questions of treatment of acute mental illness; to Dr. Desmond Curran, F.R.C.P., Consultant in Psychiatry to the Royal Navy, for the interest he has shown and the encouragement he has given me; and to Surgeon Vice-Admiral H. St. G. Wolston, Medical Director-General of the Navy, for permission to publish this paper.

[illegible]

ANÆSTHESIA: 100 YEARS OF PROGRESS[1]

BY

Surgeon Captain H. PARRY PRICE, R.N.V.R.

One hundred years have now passed since the first operation was performed under general anæsthesia. This operation was performed by Warren at the Massachusetts General Hospital on a patient under ether anæsthesia. The anæsthetic was administered by a dentist named Morton using a glass flask containing the ether, the patient drawing in air over ether.

In all fields of scientific endeavour progress and change go hand in hand. The two world wars, in fact—1914-1918 and 1939-1945—accelerated research and invention in every branch of science, not least in that of anæsthesia.

The discovery of the effects of ether in the first place appears to be due to the American practice, during the first half of the nineteenth century, of holding "cocktail parties" at which the boys and girls inhaled ether and became very happy: this was called "ether frolics". Not only did they discover that ether vapour was respirable, but that too large a quantity as with gin caused stupor.

In 1818 Michael Faraday had drawn attention to the fact that the effects of ether and nitrous oxide were similar. In January 1845 Morton had attempted to anæsthetize a lusty young medical student, for dental extraction, under nitrous oxide. This was not successful. The student yelled lustily, the audience howled, and the whole show ended in a complete shambles with the anæsthetist pursued from the room by an infuriated audience. Nitrous oxide was then ridiculed and for eighteen years fell into disuse. Even after the lapse of one hundred years one still finds people who will not realize that gas and oxygen by itself is perfectly useless as an anæsthetic for the hefty, lusty young adult or for the heavy drinker. Gas oxygen is the ideal anæsthetic for the badly shocked and "knocked out" patient. He *needs* it—the robust patient neither needs it nor will he be anæsthetized by it.

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[1] Being a paper read at a Scientific Meeting at R.N. Hospital, Plymouth.

On 21st December 1846 Liston amputated a leg under ether anaesthesia at University College Hospital London. This was the first operation under an anaesthetic in Europe.

The first to appreciate the urgent need for physiological research was John Snow a Yorkshireman whose books "On Ether" and "On Anaesthetics" should be read by every anaesthetist. It was Snow who in 1853 administered chloroform to Queen Victoria during the birth of Prince Leopold and again in 1857 for the birth of Princess Beatrice. Snow was the first to draw attention

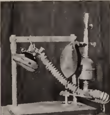

Fig. [illegible]—Clover's ether inhaler modified for [illegible]

to paralysis of the intercostal muscles in [illegible] and to use an agent to absorb CO_2 in closed circuit anaesthesia.

Simpson an Edinburgh surgeon was the first to use chloroform as an anaesthetic. In a paper he read in Edinburgh on 10th November 1847 he wrote enthusiastically of chloroform "having tried it upon upwards of *thirty* individuals." He did great service to anaesthesia because his listeners soon drew attention to the dangers of chloroform and thus caused much scientific investigation upon the nature of anaesthesia.

Snow was followed by Clover whose name is still known to-day. He invented the Clover ether inhaler and he was the first to suggest and make practicable a nitrous oxide–ether sequence. The Clover inhaler is often used now with slight modification for the administration of trilene.

Very little progress took place after this until the first great war of 1914–1918, but work in the casualty clearing stations in France soon exposed the dangers of ether and chloroform in cases of acute shock and continuous gas oxygen was found the ideal anæsthetic in such cases. Machines were devised by Boyle and also by Geoffrey Marshall who, although now a well known physician, was at that time an anæsthetist.

The pioneer work of Sir Harold Gillies and his co-workers of the British Army Plastic Unit at Sidcup is now historic in the annals of surgery. They were faced with the problem of providing safe, light and smooth anæsthesia for operations on the face and upper respiratory passages which frequently lasted several hours. Insufflation endotracheal anæsthesia fulfilled these requirements. In connexion with endotracheal anæsthesia it is interesting to recall that in 1878 Sir William McEwen, surgeon to Glasgow Royal Infirmary, decided to essay the introduction of tracheal tubes by the mouth; the method was, however, first used by Trendelenburg in 1869.

The first gas oxygen machines of 1914–1920 were not in any way ideal. The nitrous oxide itself was poor, containing far too much water, which caused blocking of the valves by icing up, and small spirit lamps were attached to prevent this. Why no explosions occurred in those days it is difficult to explain. Reduced pressure valves had not then been invented—the flow of gas was controlled simply by the ordinary cylinder tap. The proportion of gas to oxygen was measured by the bubbles passing through a bottle of water.

As with all new ideas the use of gas oxygen and of endotracheal ether was much abused and was often chosen very wrongly and unnecessarily—even to-day such things are not unknown. Disasters occurred such as deaths from prolonged anoxia under gas oxygen and from surgical emphysema due to poor technique in passing endotracheal tubes. One such death was reported after an operation for varicose veins.

Insufflation of gaseous agents at a positive pressure over a long time proved expensive. About 1920 it occurred to Magill that anæsthesia could be maintained more physiologically as well as more economically if a *wide* bore rubber tube were inserted into the trachea and the patient allowed to breathe through it in both directions; thus he reverted to the inhalation system. We have tried out recently a much larger tube capable of taking a large connexion of standard size, regardless of the size of the actual tracheal tube. Only the portion of tube actually in the trachea (4½ inches long) is of variable size. The upper half, which extends only as far as the larynx, is of 12 mm diameter and of fairly stiff rubber. The object being to keep the tubing and connexion as far as possible of the same diameter as the trachea (14 mm), resistance to breathing is lessened markedly, as will be realized at once by comparing an ordinary connexion and tube with one of these.

In 1926, while searching for something to quieten the spasms of whooping cough, avertin was discovered in Germany by Willstater, and it was recognized at once as an extremely promising anæsthetic. Gwathmey had introduced ether and olive oil rectally in 1913 but it was not very satisfactory. Wine (usually port wine) also administered rectally in doses of [illegible] has proved an extremely pleasant pre-operative sedative.

The first successful intravenous anæsthesia in man was accomplished in 1872 by Oré using chloral hydrate. The French naval surgeon Forné used this in 1874 employing 2 to 5 grammes chloral for the purpose. Intravenous anæsthesia did not come into general use until Magill introduced nembutal from America in 1928. This was a *long* acting barbiturate and it had the great disadvantage that it often delayed the return of consciousness by two or three hours. Directly the ultra *short* acting barbiturates—evipan and pentothal—came into use nembutal was abandoned.

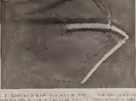

FIG. 2. [illegible]
(This particular tube is [illegible] up to an [illegible] are these.)

PENTOTHAL

Evipan was displaced by pentothal which was [illegible] and gives better muscular relaxation. It has two drawbacks: it is a powerful respiratory depressant, and if injected inadvertently under the skin it may cause severe sloughing of the surrounding tissues. Pentothal is used mostly as an induction agent. It is much more pleasant for the patient, it saves much time and much less ether is required afterwards. It is, however, very useful when given (1) in split doses as the sole support to gas oxygen, (2) rectally where intravenous administration is inconvenient or impracticable, and (3) in a small but rapidly administered dose to subdue the gas resistant patient in the dental chair.

(1) When administered in split doses the usual 1 gramme induction dose is

given first followed by gas-oxygen. The patient is taken into the theatre and the operation commenced. When required further doses of pentothal are given as relaxation wears off but a total dosage of 2 grammes should not be exceeded.

I used this method for a series of 18 cases in this hospital in 1944 and not one of them vomited or developed pulmonary complications. Eight of the cases were appendicectomies of some forty minutes' duration.

(2) Used rectally the dose of pentothal is 1 gramme in 50 c.c. of water per 50 lb. body weight. It makes an injection of small bulk, easily retained and most effective.

(3) When used in a *small* dose for the rapid induction to a dental gas, pentothal should be injected *quickly*, resulting in cerebral saturation for a very short time after which the tissues receive some of the dose and the patient recovers consciousness quickly. The dose given thus should not exceed 0.3 to 0.4 gramme.

Caution should be used when giving pentothal in the case of frail or elderly patients or cases of shock, when the dose should be cut down markedly; the dangers of pentothal do not lie in the drug itself but in the man who gives it. The drug is broken down by the liver and excreted by the kidneys, and in shock excretion is grossly delayed. One case is on record of a badly wounded and shocked patient who received one gramme of this drug and remained unconscious for forty-eight hours.

This subject is incomplete without reference to intravenous analgesia. Gordon of Canada has used a 0.3 per cent. solution of procaine in 10 per cent. glucose saline analgesia recently whilst cleaning up extensive burns. About 700 c.c. of this solution is given as a *slow* intravenous drip taking at least one and a half hours to administer. This proceeding is carried out in the resuscitation department. General analgesia is obtained, the mental faculties remaining alert.

CYCLOPROPANE

This was first used by Waters at the Madison School about 1934, and it can now scarcely be regarded as a new agent. As far back as 1921 he had introduced closed circuit CO_2 absorption into general use in America.

The chief use of cyclopropane—and also its greatest danger—lies in its potency. 10 per cent. cyclopropane in 90 per cent. oxygen will cause unconsciousness, and it is quite easy to deepen the plane of anæsthesia from first plane to deep third plane within a minute, while the lightening of this anæsthesia is nearly as rapid. It is very explosive and is a powerful respiratory depressant.

Cyclopropane is the ideal anæsthetic in thoracic surgery. It is non-irritant to the lungs, systolic blood pressure is raised, and there is no damage to liver or kidneys as there is with ether, while muscular relaxation is good. The outstanding advantage is the high percentage of oxygen which may be given with it. Contrary to early reports it does cause some post-anæsthetic vomiting, and capillary oozing during operation is rather excessive.

Cyclopropane should not be used by the occasional anæsthetist.

TRILENE

Trilene [illegible] anaesthetic [illegible] as a dry [illegible] trilene should [illegible] powerful analgesic [illegible] anaesthetic. It [illegible] for brain explorations [illegible] knee joint operations and prolonged dental extractions [illegible] tonsillectomies and circumcisions. Many of the above operations [illegible] of the operating lists in a naval hospital.

Trilene is useless for abdominal surgery [illegible] unnecessary use of this agent for such cases [illegible] If administered in sufficient concentration to obtain muscular [illegible] may readily cause cardiac irregularities of [illegible] respiratory rate of 40 to 50 per minute. In 1944 Surgeon Lieutenant [illegible] Holford, then medical specialist in R.N. Hospital, Plymouth [illegible] investigations with the electrocardiograph on patients [illegible] by trilene, and the results revealed grave cardiac irregularities.

Consumption of trilene should not [illegible] this means that when used with an ordinary gas-oxygen [illegible] should *never* be allowed to bubble through the trilene [illegible] pass over it. It can be shut off altogether about ten minutes [illegible] of the operation when the patient will probably leave the theatre [illegible] state and with all reflexes recovered.

Trilene should never be used with a CO₂ [illegible] to dichloracetylene may be caused by the heat of the soda-lime. Post-anaesthetic vomiting after trilene is almost unknown and capillary oozing from cut surfaces is markedly less than with any other agent. It is non-explosive and can therefore be used with the diathermy. It is non-irritant to the lungs and is quite capable of causing analgesia in the presence of full consciousness, hence its value in midwifery.

CURARE

Curare has no anaesthetic action whatever, nevertheless its introduction would appear to be one of the most dramatic developments in the art of anaesthesia. Mallinson stated in 1945: "In curare we have an agent capable of producing relaxation comparable with spinal methods in the presence of light anaesthesia, *an ideal hitherto quite unattainable*."

Messrs. Burroughs Wellcome have produced a preparation of curare known as Tubarine. This is a sterile solution containing 10 mg. of d-tubocurarine chloride per 1 c.c. Tubarine paralyses skeletal muscle by blocking the nerve impulse at the myoneural junction.

The effects of Tubarine in therapeutic doses are transient, owing to the rapid elimination of the drug, partly by destruction in the liver and partly by renal excretion. It produces adequate relaxation in combination with simple gas-oxygen in surgery involving the abdomen or pelvis. The early return to consciousness, the comparative freedom from shock and the reduction in post-operative complications are outstanding features of anaesthesia supplemented

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by Tubarine. For the poor-risk patient submitted to major surgery, and also for the long operation, this is of particular value.

There is no fixed dosage for Tubarine any more than there is for any other anæsthetic drug. Guiding principles are body weight, general condition of the patient and the potency of the supporting anæsthetic agent, a rough guide to dosage being 2·5 mg. per stone of body weight. (A 1·5 c.c. ampoule contains 15 mg.) This dose should suffice for a fit man under gas-oxygen. With ether in a quite weak concentration the dose should be halved. It is important that the dose, usually about 1 c.c., be given *slowly*, taking a full one and a half minutes by stop-watch. The effects last about forty-five minutes, after which the dose may safely be repeated.

Tubarine may be used with intravenous barbiturates, but extreme caution is necessary since both are respiratory depressants. It is possible for the drug to produce such muscular relaxation as to cause paralysis of the respiratory muscles; hence it should be used only by those with experience in controlled respiration, and measures for dealing with the apnœic patient must be available. The patient should always be kept supplied with oxygen, preferably by means of a closed-circuit apparatus, whilst in the operating theatre.

Supplies of curare are still somewhat irregular and we certainly do not know enough yet about the effects of this much-honoured drug. It would be foolish to be too enthusiastic about it until reports have been made on many thousands of administrations.

CONCLUSION

It is interesting to note that in 1846 the first anæsthetic was given by an unqualified man—a dentist named Morton—and the recent advances recorded here show how the anæsthetist of to-day needs to be no mere "giver of snuffs." He must have a knowledge of physical as well as biological science, and a thorough understanding of such allied subjects as physiology, pharmacology and chemistry; this is essential for the intelligent administration of the present-day anæsthetic.

The recent advances in anæsthesia have benefited both surgeon and patient, though the complicated modern apparatus is often made fun of. It cannot be denied, however, that many of those beautifully relaxed bellies of the old chloroform-and-ether days were obtained at a cost.

Third plane anæsthesia can be obtained only at a cost to the patient; such complications as acute dilatation of the stomach have been proved to be due not so much to the actual agent used but to the time the patient has been kept deep in the third plane. Modern apparatus can provide deep anæsthesia just when the surgeon requires it, and no longer "chloroform and ether knocked them out and kept them out!"

The average doctor, while realising fully that he has something to learn in other fields of medicine, is apt to be unduly complacent about his knowledge of anæsthesia and the technique of its administration. In short, we must abolish the old idea that "any fool can give an anæsthetic."

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MASS X-RAY EXAMINATION OF THE CHEST

BY

Surgeon Commander S. H. R. PRICE, R.N.

When the Royal Navy introduced mass fluorography to this country in 1940 the intention was that all naval personnel should have their chests X-rayed and re-X-rayed periodically. Wartime conditions made it difficult, if not impossible, for men to be re-X-rayed annually, but during the past five and a half years large numbers of personnel have been examined radiologically and a large number of cases of pulmonary tuberculosis which would not otherwise have been detected have been brought to light. I say "would not otherwise have been detected" in view of the fact that almost all these cases had been examined and passed as fit by ordinary clinical methods, sometimes within a matter of days of being X-rayed. They were, in fact, cases of so-called "symptomless tuberculosis", those in which little or nothing could be made out on physical examination.

Where so much good can be and is being done, not only in detecting tuberculosis before it has reached a stage where cure is difficult, if not impossible, but above all by preventing dissemination of the disease, it seems a pity that there should be comparatively large numbers who are not benefiting by this method of examination still.

In a naval hospital in the Far East a check was made recently of all patients admitted to the hospital and it was found that some 40 per cent. had never been through a mass fluorographic department. In this country it is disappointing to find men coming to be X-rayed as part of the demobilization routine who, in spite of having served for five or six years, have not been X-rayed before. Under wartime conditions it is almost impossible, of course, to prevent large numbers slipping through without being X-rayed, but now that we are at least on the way to a return to peacetime routine I feel that every effort should be made to ensure that a procedure is adopted in the future whereby the whole, and not just the comparative few, benefit by the scheme. The efficacy of the scheme is now an accepted fact, and there should be no need to have to emphasize to medical officers the importance of making sure that those under their care have had their chests X-rayed and are re-X-rayed periodically (if possible every nine months).

The following case is a typical example of what is still happening all too frequently.

A young rating who had for some months previously been serving in one of H.M. ships was sent for routine X-ray. He had been in the Navy for four years but had not been X-rayed previously. He stated that he felt perfectly fit except for a slight productive cough which had been present for some months, and clinical examination revealed no abnormal physical signs. His erythrocyte sedimentation rate was 4 mm. per hour (Wintrobe), but his sputum was loaded with tubercle bacilli and his radiograph (*see* fig. 1) showed extensive tuberculous infiltration of the upper half of both lung fields, with multiple cavities. A communication was sent to the medical officer of his ship suggesting that the entire ship's company should be sent for X-ray examination. This was carried out ultimately when four further cases of active tuberculosis were brought to light in addition to several cases of latent or inactive tuberculosis who were recommended for further observation.

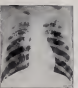
This is not an exceptional case—it is merely one example of many similar cases seen in our mass fluorography departments. I feel that such a state of affairs could be obviated to a large extent if medical officers of ships and shore establishments would make greater efforts to see that the regulations were complied with.

Fig. 2 (showing extensive tuberculous infiltration of both lungs) is a further glaring example of what should not be allowed to occur. This rating was sent to R.N. Auxiliary Hospital, Colombo, for X-ray examination of his chest. He felt and looked perfectly fit and the accompanying form M.99 read "Coughed up some blood-stained sputum yesterday. No physical signs in the chest." The patient had left the United Kingdom a month previously and had not been X-rayed before joining his ship. Bacteriological investigation confirmed the presence of an active tuberculous infection and he was invalided off the station. A communication was sent to the senior medical officer of the ship recommending X-ray of all contacts and any members of the ship's company who had not been X-rayed during the previous nine months, but as the ship was leaving Colombo the following day this could not be carried out and one can only hope that the recommendation was complied with on arrival at their next port of call.

It is at present the duty of medical officers to lecture to the ship's company on such subjects as venereal disease, general hygiene, &c. Would it not be advantageous if the men could also be given a short talk explaining the benefit derived from periodic X-ray examination of the chest? I feel certain that there is at present a comparatively large section of personnel who try purposely to avoid being examined radiologically because of the fear of being "picked up". Under present conditions it is not very difficult for a man to avoid it if he does not wish to be X-rayed. In naval depots joining routine is not considered complete unless the X-ray departmental stamp and serial number is in the man's pay book. However, laxity in the checking of pay books does mean that this regulation is frequently not complied with.

With the general improvement in conditions and reduction in the number of men serving, it is to be hoped that it will become increasingly difficult for a man purposely to avoid being X-rayed and/or X-rayed periodically. Nevertheless it would seem that a system of education rather than compulsion would be of value and that lectures similar to those given on venereal disease, &c. would help towards this end. If men could be made to realize by having the scheme explained to them in simple language the benefit derived from periodical X-ray examination we would, I feel sure, see fewer cases of pulmonary tuberculosis who, in spite of many years service, have no record of having been examined radiologically previously.

It is important to avoid creating an impression that mass radiography is



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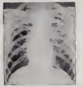

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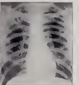
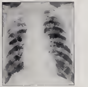


[illegible] 3. Infiltration in the right upper [illegible] left interspaces. Thick walled [illegible] Healthy looking [illegible] symptoms and [illegible] sputum positive [illegible] sedimentation rate [illegible] (Westergren). Repeated [illegible] nothing to worry about [illegible] was not X-rayed at the time.



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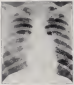

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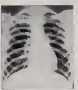
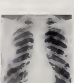
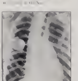


[illegible] the left [illegible] aged 18 [illegible] for [illegible] but [illegible] was [illegible] one [illegible]





[illegible] No [illegible] and [illegible] intended for those already ill, or that the invitation to be examined means either that illness is suspected in the individual or that there is danger in the condition of his work. The point to be emphasized is that the examination provides information: reassurance if no abnormality is found, and the opportunity, if abnormality is found, to apply the remedy at a stage which is favourable to an early recovery—at a stage when ignorance of the condition may mean risk of permanent incapacity or even premature death.

Figures showing the results obtained by mass fluorographic examination in the Royal Navy have been published already. In one department alone some 365 000 men and women have been examined, of whom 9 504 were found to have intrathoracic lesions requiring investigation in hospital. Of the total examined, 2·63 per cent were found to have adult type pulmonary tuberculosis and the large majority of these cases were symptom free. The accompanying table shows a very brief summary of results obtained from examinations carried out in one of our naval mass X ray departments.

TABLE SHOWING BRIEF SUMMARY OF RESULTS OF MASS X RAY EXAMINATIONS

Total number of personnel examined		365 045
	Number of cases detected	*Percentage of cases detected*
Intrathoracic pathology requiring investigation	9 504	2·63
Adult type pulmonary tuberculosis (30 per cent active, 70 per cent inactive)	4 211	1·15
Non tuberculous conditions	5 290	1·44

SUMMARY OF SOME OF THE MORE INTERESTING NON TUBERCULOUS CONDITIONS SHOWING NUMBERS DETECTED

	Number of cases detected
Cardiac lesions	198
Dextrocardia	50
Bronchiectasis	67
Foreign body in lung	20
Intrathoracic tumour (carcinoma, neurofibroma, chondroma, &c)	18
Silicosis	9
Eventration of diaphragm	32
Diaphragmatic hernia	8

(The above figures refer to work carried out in one naval department up till September 1948. There are at present six similar departments in operation.)

As more equipment becomes available it is to be hoped that new departments will be put into operation and so greater facilities for X raying large numbers of men and women in a short space of time will be offered. Obviously a mobile unit would be of great service and a great saving in man hours where ships are lying some distance from static units, and it is understood that the installing of a mobile unit is at present under consideration. Seven departments are at present in operation, however, and it should not be difficult for medical officers to make certain before their ship leaves home waters for service abroad that every member of their ship's company, including officers, has had his chest X rayed recently.

It is of course equally important that officers should benefit by the scheme but unfortunately there is no mechanism at present whereby they are X rayed as a routine on joining their ship or establishment also the absence of medical documents makes it impossible for a periodical check on past investigations and medical history without interviewing each individual officer It cannot be emphasized too strongly therefore that medical officers should whenever possible explain the advantages derived from periodical X ray examination of the chest and encourage all officers to avail themselves of the scheme

Mass fluorography can play a very large part in the eradication of pulmonary tuberculosis in the Service but it can do so only by the full co operation of those officers—both medical and executive—to whose care the health of the men under them is committed

I should like to express my thanks to Surgeon Captain A W Gunn *M B O* R N for permission to submit this article for publication and also to S B I O Linnett for his assistance in the reproduction of the radiographs

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Clinical Notes and Cases

A CASE OF PULMONARY TUBERCULOSIS TREATED WITH STREPTOMYCIN

BY

Surgeon Commander E D CALDWELL, R N

This account describes the use of streptomycin in a fatal case of miliary tuberculosis The case in itself presents no clear cut items of clinical interest but undoubtedly has some unusual aspects and if only for the fact that it is the first case in R N Hospital, Haslar, to be treated with streptomycin is possibly worthy of publication

One would like to record a happy ending but unfortunately, after an early and quite dramatic improvement the patient relapsed and went downhill, his subsequent demise being surprisingly protracted

On 14th April 1945 the patient (an engineer officer) was admitted to a naval auxiliary hospital for a minor operation On routine examination of his chest a patch of infiltration was seen in his right lung and on further investigation he was found to have a positive sputum and an erythrocyte sedimentation rate of 28 mm /1 hr (Wintrobe) The patient stated that there was no relevant family history but that he himself had worked in close proximity to a rating who was subsequently discovered to be suffering from active pulmonary tuberculosis three years previously during the two and a half years prior to admission he had had four attacks of "bronchitis" He also stated that he had lost a little weight

Fuller investigation revealed infiltration and a cavity in the right upper zone He was recommended for and accepted on the Admiralty long term scheme and sanatorium treatment was arranged

The following sixteen months of his treatment can be summarized briefly and will subs[illegible] to October 1946 when he was admitted to R.N. Hospital Hasla[illegible] tuberculosis.

In A[illegible] 1945 [illegible] admitted to a sanatorium where a right artificial pneumothorax was induced. [illegible] discharged to his home in January 1946 at his own request where he attended the [illegible] tuberculosis clinic for fortnightly refills until July 1946. All reports covering the period are satisfactory and he appeared to be making good progress towards recovery at that time with a selective collapse of the [illegible] upper lobe.

About the end of July whilst on holiday in Cornwall the patient began to feel "off colour" and found that he had a raised temperature. He accordingly retired to bed for a few days but he [illegible] something wrong, [illegible] at a hospital [illegible] where an X-ray [illegible] suggested miliary spread to the left lung.

He returned to his home [illegible] the tuberculosis officer who had been treating [illegible] and arrangements [illegible] the patient to be admitted to R.N. Hospital Haslar.

On his arrival at Haslar on 2nd October 1946 the patient looked unwell and complained of dyspepsia, cough and soreness in throat. He was running a slightly irregular evening temperature. Examination revealed absent breath sounds over the right upper lobe and harsh breathing with crepitations and impaired percussion note over the left mid and lower zones. Neither liver nor spleen was palpable. His throat showed a shallow ulcer on the anterior pillar of the fauces and enlarged tonsils. His erythrocyte sedimentation rate was 30 mm. in one hour (Wintrobe) and report on X-ray of the chest stated: "There is a small right-sided artificial pneumothorax. There is a fine mottling spread throughout both right and left lung fields. The appearances are those of miliary tuberculosis."

The following day the patient was given an artificial pneumothorax refill 1,600 c.c. which caused him no distress or discomfort. His throat and dyspepsia were treated and taking all things into consideration he felt fairly comfortable but looked ill and toxic.

On 17th October 1946 he was seen by the consultant in chest diseases whose report stated (abridged): "This patient is a case of miliary tuberculosis. It is surprising that he has not gone more appreciably downhill in the last few weeks. His prognosis is grave. Streptomycin is now available in such cases and it is suggested that Admiralty be asked for an adequate amount for the treatment of this case. The A.P. should be continued."

A request was made to Admiralty for a supply of this drug. Meanwhile the patient's condition deteriorated. For two or three days he had been drowsy and [illegible] complaining of cough and giddiness and morning nausea. He [illegible] after his breakfast and this persisted for several days. Examination at this time revealed no alteration in the clinical signs and no abnormality was found in the central nervous system. His erythrocyte sedimentation rate on 29th October was 32 mm. in one hour (Wintrobe) but his blood picture was normal. There was a persistent tachycardia of 90 to 110; respiratory rate was unaltered. His artificial pneumothorax was maintained with weekly refills.

There was a not unnatural delay and difficulty in obtaining streptomycin, but a supply arrived on 3rd November from Medical Department, Admiralty. At this time very little information was available as regards its optimum dosage in such cases, its possible effect on the course of the disease and/or complications. 17 grammes of streptomycin was supplied, each gramme containing 1,000,000 units. The dosage given was 1 gramme dissolved in 8 c.c. of sterile water and divided into eight intramuscular injections per day, which in effect meant that the patient was getting 125,000 units every three hours night and day for seventeen days. These injections were given into the buttock without any local anaesthetic and appeared to cause no pain or discomfort throughout the entire treatment (it has been reported that severe pain accompanied injection). Nor were any complications noted, though the possibility of giddiness and/or deafness had also been reported (stated to be due to a possible selective neurotoxic effect on the eighth cranial nerve).

On 4th November, the day following his first injection of streptomycin) the patient stated he [illegible] better and apart from a slight feeling of constriction across his forehead [illegible] complaints at all. On 5th November he [illegible] bright and cheerful and [illegible] his appetite. [illegible] a noticeable feature as up till then he had been extremely apathetic [illegible] his meals. This improvement [illegible] unprecedented—might well have been due to [illegible] effect of the patient realizing that he was being given the new publicized [illegible] drug, but on the other hand the improvement was borne out by a marked drop in pulse rate and temperature [illegible].

On 8th November his E.S.R. had fallen to 8 mm. in one hour (Wintrobe) and his full blood count was as follows:—

		Differential count	
Red cells	5,000,000 per c.mm.	Polymorphs	[illegible] per cent
Haemoglobin	101 per cent	Lymphocytes	[illegible] per cent
Colour index	1.0	Monocytes	8 per cent
White cells	10,800 per c.mm.	Eosinophils	1 per cent

X-ray [illegible] of his chest was seen again by the chest consultant who stated (abridged) "[illegible] condition and symptoms improved [illegible] and temperature dropped. X-ray appearances are not certainly altered but perhaps the lesions are a little more discrete in the latest film."

On 15th November a further [illegible] of 300 c.c. was given at the particular request of the patient; it was not really indicated from the [illegible] point of view but psychologically it was considered advisable at that time.

On the 18th the patient's condition changed; he became morose and miserable and in the evening his temperature had risen to 100.2 F. On 19th November he was running a raised morning and evening temperature and had [illegible] his morning vomiting. These new symptoms, it must be realized, had occurred while he was still having streptomycin, and it was considered possible that he could be developing a resistance to the drug—but this was purely conjectural. There was no alteration in his physical signs and he had no definite complaint, merely stating that he "didn't feel so good."

On 20th November he completed his course of streptomycin and in any case no more was available, and on the following day he was complaining of fairly persistent headache and transient aches, pains and discomfort throughout his chest and abdomen. His general appearance had altered considerably for the worse and he looked consistently ill and apathetic. His E.S.R. had risen again to 18 mm. per hour, but his blood count and differential count were not appreciably altered.

On 30th November he complained of "pins and needles" in his right leg and increasing headache; he also vomited four times during the day. Examination of his central nervous system revealed no abnormality. He was looking ill and apathetic and that night he was placed on the Serious Case List. Four days later he complained again of "pins and needles" in his right leg, and on examination (of which he was rather resentful) he was found to have an apparent partial paresis of his left leg—I say apparent as he appeared to be unable to lift it clear of the bed although no definite abnormality could be found on testing it. Knee and ankle jerks were present and equal on both sides. There was no sensory loss, tenderness or wasting, no spasticity, and plantar responses were flexor. He stated that he had passed no urine for fourteen hours; however, his bladder was not distended at that time.

That afternoon (4th December) at 1330 he stated that he could not lift either leg (examination still negative). At 1500 he had a seizure which apparently lasted for about two and a half minutes and was described to me by a V.A.D. nurse as "a maniacal outburst of shouting and swearing followed by a sort of epileptic fit"—when I saw him two or three minutes later he was conscious but confused and complaining repeatedly of headache. He had a [illegible] slightly rigid neck and marked photophobia but his reflexes were still present and equal and plantar responses remained flexor. Kernig's sign was doubtful. His discs were normal but the pupils were rather dilated.

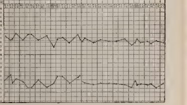
although [illegible] normally. In view of the apparent spread of the infection he was given ½ grain morphine, placed on the Dangerous Case List and his relatives summoned.

The following morning I saw him at 0700 and found him sitting up in bed smoking, mentally clear and complaining only of slight headache and a distended bladder. His bladder was catheterized. Lumbar puncture was carried out and gave the following interesting findings:—

No increase in pressure	Crystal clear fluid
Cells	1 per c.c.
Protein	70 mg. per cent
Globulin	slight excess
Chlorides	640 mg. per cent
Sugar	25 mg. per cent

Day after day the patient's physical state fluctuated, as did his mental faculties. He complained constantly of headache and inability to pass urine, and was given morphine as required, with 1 c.c. Carbachol intramuscularly for his urinary retention. Clinically there was little to show pertinent to the gravity of his illness. He had a persistent tachycardia and raised evening and morning temperature. [illegible] periods alternated with bouts of disorientation. Examination of his central nervous system remained stubbornly normal apart from absent abdominal reflexes. Vomiting was frequent, headache constant, and his bladder functioned only after the administration of Carbachol. His blood count showed no marked change, [illegible] sedimentation rate had dropped to 9 mm. 1 hr.

This was now 20th December—sixteen days after the [illegible] meningitis. On 22nd December he became extremely confused and drowsy. The following day his condition was deteriorating rapidly and he now appeared to be quite inaccessible to the outer world. On examination his pupils were dilated and the [illegible]



Temperature and pulse rate charts before and after commencement of treatment with streptomycin [illegible] with the exception of the abdominal [illegible] still present. [illegible] plantar responses were equivocal and the abdomen was scaphoid [illegible] had not altered to any appreciable extent since his admission.

He clung [illegible] a further three days till the afternoon of 26th December when his respiration [illegible] ceased suddenly and he died.

SUMMARY

The patient developed left sided miliary pulmonary tuberculosis during the apparently satisfactory treatment of a right sided pulmonary infection.

He was admitted to R.N. Hospital, Haslar where he was treated with 17 grammes of streptomycin following which there was a definite though transient clinical improvement. His condition relapsed during the course of injections of streptomycin and there was a spread to the central nervous system the manifestations of which were somewhat obscure and atypical.

It is not intended here to discuss the possible pathologies of this or the actions of streptomycin but it is interesting to conjecture whether this drug may have masked or altered the normal picture of tuberculous spread in the central nervous system. Unfortunately a post mortem examination could not be carried out.

Incidentally it should be pointed out in passing that cases of chronic miliary tuberculosis have been described recently. They were stated to have had a protracted course extending up to two years.

Since writing this report it has also become apparent that streptomycin would have to be used in larger doses than in the case described above and over a much longer period. Results are still far from conclusive.

FIVE CASES OF POLIOMYELITIS IN JUNGLE COUNTRY

BY

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(Lately Temporary Surgeon Lieutenant, R.N.V.R.)

DURING the latter part of 1943 a small outbreak of poliomyelitis occurred in Trincomalee. Sporadic poliomyelitis is known to occur in tropical countries where it affects chiefly the European peoples but in this part of the world it was considered by the local medical practitioners to be a rare disease. In view of the recent new data concerning the transmission of the disease and a renewed interest in its epidemiology this isolated group of cases occurring in jungle country is recorded.

Four cases were notified between 21st and 26th October and one further case on 11th November covering a total period of three weeks. The outbreak was entirely self limited and investigation of a possible common source of infection was profitless; indeed had the statisticians wished to pick five

European Servicemen from the area at random, taking care to exclude those with common sources of food and water, they might well have chosen just these five young men. One was a sick berth attendant who kept lonely watch at a first aid post serving some 100 fire fighting personnel; another was a corporal, Royal Marines, living five miles away by sea and working on an island even farther away; another was a sub lieutenant from a ship at moorings in the harbour about two miles distant from either of the previous patients; the Army lieutenant and aircraftsman were equally dispersed.

A description of the terrain is perhaps of interest. The whole area, in which were a multitude of hastily built Naval, Army and R.A.F. camps, as well as numerous coolie labour depots, covered perhaps 30 square miles of "dry jungle" country intersected and cut up by uninhabited islands. Sanitation was of necessity primitive but was under the fairly strict control exercised by local units with the advice of Service health officers. Native living conditions were, on the whole, very unhygienic and were not subject to much alteration or change. Drinking water was obtained from a chain of suitably protected surface wells or carried by water tanker from other parts of the country. Some but not all of the drinking water was chlorinated. Food was mostly imported, though fresh fruit and vegetables were grown locally.

However, it is from the clinical point of view chiefly that this outbreak is of interest.

Case I.—A sick berth attendant aged 21 was admitted to the naval sick quarters on 19th October 1943 complaining of headache and slight feverishness. The pyrexia, which was of mild degree, subsided in twenty four hours and the patient felt perfectly well, though there was a mild redness of the pharynx. On 23rd October he was discharged back to duty but was readmitted on the 24th late at night complaining of severe headache, backache, shivering and malaise; blood films showed no malarial parasites. He was very restless all night and in the morning his general condition suggested some form of meningeal irritation; he was irritable, restless and anxious, but his mind was clear. He now complained of pain in the back and nape of the neck, and objectively there was a mild degree of neck rigidity. Urine showed a trace of albumin. Lumbar puncture showed clear cerebrospinal fluid not under increased pressure but containing 25 leucocytes per c.mm., of which 21 were lymphocytes. Temperature was 102° F. and the pulse rate 120 per minute. At 1900 the same day the patient complained of weakness in the right wrist and difficulty in getting his breath. The right side of the thorax was not working well and dyspnoea was apparent.

Unfortunately, arrangements to transfer the patient by air to a base hospital where a Drinker respirator was available broke down owing to [illegible] conditions, so the 180 mile journey was made by ambulance. From 2000 until 0510 26th October, mostly whilst in the ambulance, artificial respiration was carried out by manual compression of the thorax. The patient was in poor condition but mentally clear and [illegible]. At 0800 26th October he was installed in the respirator with considerable improvement in his condition. However, at 1600 the same day he complained of difficulty in swallowing, and his condition deteriorated. He died at 0740 27th October 1943.

Case II.—A lieutenant, R.A., aged 28, was admitted to the Army hospital on 20th October 1943 having felt feverish for one day. On 21st October frontal headache was troublesome, there was some neck rigidity and loss of tendon reflexes in the legs. Temperature 101° F., pulse rate 72 per minute. The weakness of the legs increased and cerebrospinal fluid showed 18 cells per c.mm.; his general condition improved and the pyrexia subsided.

On 23rd October he was transferred by air to a base hospital. It is understood that he made a good recovery but was left with some considerable weakness of the legs.

Case III.—Able seaman, aged 25, admitted to the Army hospital on 22nd October 1943 complaining of [illegible] and aching pain in the head and neck of four days' duration. Temperature was 98.8° F., pulse-rate 80 per minute; no abnormal physical signs were detected in the central nervous system. The next day he complained of weakness of the right arm and on examination there was weakness of both arms, the right more than the left, and absence of tendon reflexes in both. His temperature was now 101.4° F. and pulse-rate 100 per minute.

He was transferred immediately by air to a base hospital; during the journey he became cyanosed and his breathing was embarrassed. Details of his subsequent history are not known, as the hospital moved elsewhere with all its records, but it is understood that the patient died within forty-eight hours of arrival there.

Case II.—Corporal, Royal Marines, aged 28, admitted to the naval sick quarters on 26th October 1943. He gave a history of headache and backache, mild at first but increasing gradually in severity for three days, and constipation for two days. He was at this time living on a previously uninhabited island with the rest of his unit and he was able to work until the day of admission.

His headache was entirely occipital and merged with the backache which was itself referred to the line of the spinal column and did not radiate laterally. These pains were made worse by coughing and by spinal flexion. The chin could be brought only within 3 inches of the sternum. He was flushed, irritable and anxious, his temperature being 100.2° F. and pulse-rate 120 per minute. Malarial parasites were not seen in the blood films and blood leucocytes numbered 10,000 per c.mm., of which 6,400 were polymorphs. An unsuccessful attempt at lumbar puncture was made late in the evening of admission. Restlessness, extreme irritability and generalized hyperaesthesia, coupled with mental clarity, were marked features.

The next morning (27th October) his tendon reflexes were all greatly exaggerated and his general condition was worse. Lumbar puncture showed cerebrospinal fluid under slightly increased pressure with 43 cells per c.mm., mostly lymphocytes. Globulin was not increased and no organisms were seen. 3 c.c. of soluble sulphapyridine in 20 c.c. of sterile normal saline were given intravenously, and the patient was discharged by ambulance to the base hospital where sulphapyridine therapy was continued orally and 20 c.c. of convalescent serum given intramuscularly on 28th October. On 29th October he was improved but still complained of headache. Localized facial sweating was noted. Blood count showed 11,200 white cells per c.mm., of which 6,700 were polymorphs. On the 31st there was some temporary difficulty in micturition but apart from this no further signs of localized weakness, and the patient was walking by 15th November.

Apart from some loss of confidence in his physical state and continued anxiety exacerbated by two years' separation from his wife and children, he made a good recovery without developing any residual paralysis.

Case I.—Sub-Lieutenant, R.N.V.R., aged 21, admitted to the naval sick quarters late on 11th November 1943, giving a history of constipation for forty-eight hours and malaise and neck pains for thirty-six hours. On the morning of admission he felt drowsy and vomited three times. On 12th November he was seen to be anxious and jumpy, but talkative and not depressed. His face was deeply flushed and his neck held stiffly. Temperature was 102.6° F., pulse-rate 104 per minute, tongue heavily furred and fauces reddened. There was a considerable degree of neck rigidity and spinal flexion was resisted, while the left pupil was wider than the right, though both reacted normally to light and on accommodation. There was a fine tremor of the protruded tongue and occasional tremors and twitchings of the muscles of the trunk and limbs, but sensation, tendon and superficial reflexes were normal. The cerebrospinal fluid was under increased pressure and slightly hazy, containing 380 cells per c.mm.; no organisms were seen. 2 grammes soluble sulphapyridine in 20 c.c. sterile normal saline was given intravenously and the patient transferred by ambulance to the base hospital.

[illegible] therapy was continued [illegible] serum given [illegible].

[illegible] he complained of some [illegible] trunk and preferred the [illegible] was right internal strabismus [illegible] left pupil remained larger than [illegible]. All tendon reflexes disappeared [illegible] spinal fluid showed 76 cells per c.mm. and 70 mg. protein per cent. Blood [illegible] 10 400 leucocytes per c.mm. of which 6 800 were polymorphs.

Apart from some temporary paresthesia [illegible] prolonged constipation and a generalized asthenia and disinclination to [illegible] during the first week of illness, the patient made good progress without developing any gross nervous lesion. The partial ophthalmoplegia disappeared. On 1st December he was up for the first time and was discharged to sick leave on the 21st, resuming duty on 7th January, 1944.

DISCUSSION

The explosive onset and quick termination of this outbreak would suggest transmission of the virus by food or water rather than by droplet infection from carriers. No such common factor in food or water was found. In any case, apart from the negative features, the small size of the outbreak makes further discussion of the epidemiology unprofitable. However, reference must be made in passing to the fact that no cases were reported among the native civil population or among the large numbers of native troops in the area. This might suggest some exclusively European article of food as the source of the virus, but the question of racial immunity also arises.

The clinical features of these cases are somewhat unusual. Four of the five showed maximal involvement of the brain and upper part of the cord; two of these cases died with respiratory paralysis and two others should be classified as polioencephalitis. The fact that three cases showed somatic muscular paresis of the lower motor neurone type and that the single survivor of these three was left with the classical residual palsy of the lower limbs serves to distinguish them from cases of encephalitis due to a neurotropic virus such as occurred in St. Louis in 1933 or on various occasions in Japan.

The absence of convulsions in the early stages is perhaps the most important of the many clinical points which distinguish this outbreak from the cases occurring in the epidemic of Australian "X" disease in 1917-1918. In all the five cases there were well marked premonitory signs of cerebral irritation and in only one case (Case II) were these signs followed by the classical paresis of the lower half of the body. Two cases (Cases I and III) developed upper spinal cord lesions and eventually died apparently from bulbar paralysis after artificial respiration had been instituted. The two remaining cases (Cases IV and V) showed very well marked signs of cerebral irritation and one developed transient cranial nerve palsies. Certainly Case V should be classified as a case of polioencephalitis and possibly Case IV also should be included in this category.

Evidence for the value of convalescent serum by itself has been claimed by many workers, but when their results are reviewed in the light of the known variability of the severity of the disease and the difficulty of fixing diagnostic criteria in the first place, it is clear that the value of serum is completely unproven (Faber, 1941).

Similarly, the sulphonamides have been proved to be completely ineffective in the treatment of experimental poliomyelitis in monkeys (Toomey 1943) and mice (Kolmer and Rule 1941–42) in spite of an encouraging clinical trial in human cases by Rhett in 1940. The use of intravenous sulphapyridine combined with convalescent serum by Miller and Wray in 1940 would thus appear to have little theoretical justification, and the encouraging clinical results reported by them and subsequently by Batt (1942) are open to the same criticisms as are the early results from the use of convalescent serum. However, as Faber (1941) has pointed out, so little is known about the mode of spread of the poliomyelitis virus within the body, and less about the mode of action of virus antibodies, that empiricism in therapeutic trials seems to be justified. To be effective, however, these trials should be planned in advance, diagnostic criteria should be fixed, and cases sampled for treatment or control with the utmost care and precaution against any suspicion of selection. It is regrettable that two large epidemics have occurred recently within the British Empire (Malta and Mauritius) without any such careful therapeutic trials being attempted. It is suggested that some public body such as the Medical Research Council should appoint a "poliomyelitis team" to draw up plans for such trials and epidemiological research, and who would be ready at a moment's notice to proceed to the scene of an epidemic armed with plenary powers over treatment and disposal of all cases.

The clinical picture of these patients in the pre-paralytic stage was striking and one which, even in a tropical country, was sufficiently distinctive to allow of fairly confident diagnosis before the blood or cerebrospinal fluid had been examined. None of those difficult cases which show a sudden paralysis without a previous recognizable illness occurred. In fact, they all showed most of the classical pre-paralytic features as described by Powell (1938) in Australia, notably a fairly insidious onset, a tendency towards a "saddle-back" type of fever lasting three days before paralysis, a rapid pulse-rate, pain referred directly to the region of the spinal cord, resistance to spinal flexion but not rotation, cutaneous and muscular hyperaesthesia, muscular twitches and intention tremors, anxiety and mental clarity. If in future epidemics patients show such well-marked pre-paralytic features it should then be possible to carry out systematic therapeutic trials.

Obviously no conclusions can be drawn from the results of treatment in Cases IV and V along the lines suggested by Miller and Wray (1940, 1941) owing to the frequency with which cases of polioencephalitis are known to recover without evidence of permanent paralysis, although comparison between the clinical picture and the course of disease in Cases I and III on the one hand and Cases IV and V on the other provides a striking contrast.

SUMMARY

Five cases of anterior poliomyelitis occurring among Europeans in a jungle area are described, two of which were treated with intravenous sulphapyridine and intramuscular convalescent serum in the pre-paralytic stage.

The unusual features of the outbreak are discussed and the striking clinical features of the pre paralytic stage in these cases is re-emphasized.

A plan is suggested for systematic therapeutic trials during the next epidemic in this country.

ACKNOWLEDGMENTS

I am indebted to Surgeon Lieutenant Commander Ward, R.N.V.R., Naval Health Officer at Colombo at the time of the outbreak, for his help and advice.

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A CASE OF REGIONAL ILEITIS (Crohn's Disease) with discussion

BY

Surgeon Lieutenant-Commander C D. COODE R.N.

CASE NOTES

THE patient a married Chinese male aged 34 was admitted to Tan Tock Seng Hospital Singapore under the care of Professor Eric Mechie on 13th May 1946.

The history in brief was as follows —

The patient had had an indirect right scrotal hernia for some years but this had always been reducible by taxis until about fourteen days before admission. At that time after a heavy meal the hernia became irreducible and painful. His wife applied ice to the swelling and about ten hours later succeeded in reducing the hernia by direct pressure. An enema was administered shortly after this at Johore Hospital and the resulting stool contained blood.

From that time the patient's progress was stormy, his main complaint being of colicky abdominal pain occurring each evening. He was eventually referred to Professor Mechie and admitted as described above.

On admission (13-5-46) the main physical sign was a diffuse tenderness in the hypogastrium.

25th May 1946. A soft tender mass was felt in the right lower abdomen.

31st May 1946. The abdomen became slightly distended.

1st June 1946. The abdomen was more distended and it was clear that the patient had an incomplete subacute intestinal obstruction. What portion of the bowel was affected could only be surmised.

At this stage routine serum agglutination tests for typhoid group organisms were negative. The stools contained no occult blood, ova or cysts.

3rd June 1946. The patient was given a small barium meal (total volume 10 oz). Five to seven hours later a portion of terminal ileum was visualized as distended; immediately distal to the distended part was a length where the barium stream was narrow; the barium then entered the terminal ileum and caecum, the latter filling poorly

11th June 1946 The patient was given a [illegible] Mr [illegible] performed an exploratory laparotomy through [illegible] incision

The peritoneum contained no free fluid and [illegible] The right internal inguinal ring admitted one finger tip [illegible] stretched down the inguinal canal About 9 inches of the terminal [illegible] was abnormal and the pathological process stopped abruptly [illegible] valve

The diagnosis of Crohn's disease could [illegible] examination and confirmed by touch the gross findings agreed [illegible] evidence

The lesion was well demarcated and the [illegible] tubular thickening The bowel wall was firm and [illegible] could not be defined on palpation The peritoneal [illegible] flakes of fibrin—not recently formed—were [illegible] surface was hyperaemic and the vessels unusually prominent [illegible] of mesentery was thickened and contained enlarged fleshy [illegible] the gut was muscular and distended below [illegible]

TREATMENT

An ileo transverse colostomy [illegible] clamps The wound was closed without drainage of the [illegible]

Immediate post operative progress was [illegible]

DISCUSSION

Crohn's disease was described originally at a meeting of the American Medical Association by Crohn (1932) who spoke of cases on which he Ginzburg and Oppenheimer had worked and made observations The original description characterized a definite disease entity occurring in young adults affecting a sharply defined region of the terminal ileum—hence the alternative name *terminal ileitis*

The pathological change was described as an ulceration of the mucosa followed by subacute or chronic necrotizing inflammation with a disproportionate connective tissue reaction leading to stenosis of the bowel and ultimately fistula Symptoms were said to resemble those of ulcerative colitis—fever diarrhoea emaciation—and on examination there would be found a mass in the right iliac fossa

Fourteen cases were studied originally and it was concluded that the condition was benign and the inflammation non-specific

Before Crohn's original paper benign granulomata of the bowel had he said all been classed together instances included cases of Hodgkin's disease—"a late productive reaction to released strangulated hernia of the intestinal wall"—and numerous other conditions From this miscellaneous collection of tumours Crohn singled out and described vividly what he considered an entity never before noted namely a regional terminal ileitis

The response to this able description was immediate More than one surgeon in the audience rose in the subsequent discussion welcomed the classification of the new disease and contributed accounts of similar cases from personal experience where the naked eye appearances had been observed casually but where there had been failure to correlate scientifically the characteristic pathology and its implications From that day Crohn's disease has been established securely in medical literature and the whole subject of intestinal granulomata has undergone review repeatedly

Intestinal granulomata had been casually recognized for many years Abell (1937) quotes two London doctors—Charles Coombe and William Saunders—as describing such cases in 1806 while John Abercrombie described a similar case early in the nineteenth century , Moynihan (1907) called attention to tumours of the small intestine in 1907 Mock (1941) quoted a report of a non specific inflammatory tumour of the small intestine made by Braun in 1909 prior to Braun's report all such tumours appear to have been labelled " hyperplastic tuberculosis or ' false cancer

In this paper Mock quotes other instances of inflammatory tumours of the bowel and their origin He mentions the chronic hyperplastic change produced in a loop of gut strangulated in a hernial sac he also instances granulomata following such conditions as trauma to the abdominal wall, mesenteric tear use of silk suture in the bowel wall and perforation of the gut Crohn described his terminal ileitis in the following year (1932) while his description was accepted as an important contribution his conception of the extent and nature of the disease was modified rapidly

At first four clinical types of Crohn's disease were differentiated according to the stage reached by the inflammatory process —

(i) Resembling acute inflammation in the right iliac fossa , e g appendicitis with peritonitis

(ii) Resembling ulcerative colitis with diarrhoea, anaemia, wasting and fever

(iii) Presenting as stenosis of the bowel with partial or complete obstruction

(iv) The stage of fistula which may be internal or external

The differential diagnosis of each type was discussed fully and the features of each are sufficiently well known now to preclude discussion here

The distribution of the characteristic lesion was soon revised Crohn and Rosenak (1932) described involvement of the colon Harris *et al* (1933) described involvement of the jejunum The description regional ileitis was still popular but it soon became clear that any or several portions of the bowel could be affected James (1937) described a case where half the transverse colon and the proximal part of the pelvic colon were diseased

Kantor reviewed the whole subject in 1934 and in this paper occurs mention of the string sign —a name borrowed from A W Crane This string sign was well illustrated in the present case and refers to the characteristic radiological appearance after a barium meal where the gut is distended above the diseased area and then a trickle of barium resembling a length of string passes through the stenosed bowel

Kantor remarked on the frequency of an erroneous clinical or pre operative diagnosis the disease is commonly mistaken for one or other of the conditions included in the four typical groups quoted above, which it resembles and mimics successfully the true diagnosis becoming evident only on laparotomy He also pointed out that besides clinical error obvious radiological indications of the disease are also overlooked very frequently by both clinician and radiologist

Ward and Norrish (1937) suggested that Crohn's disease was a new disease, imagining that it could never have been overlooked had it occurred previously. This, however, appears unlikely, and the evidence in the literature suggests that the disease had long been recognized vaguely but not understood. Many surgeons had seen it, but had failed to differentiate between the "hose pipe" length of inflammatory intestinal wall—brought to public notice by Crohn—and the better known lump in the right iliac fossa customarily labelled "hyperplastic tuberculosis" or "false cancer."

Lick (1938), in a useful summary of the literature, shows that infective granulomata of the bowel had been known for a long time but that they had been unclassified. After excluding tumours (e.g. Hodgkin's disease and lymphosarcoma) he categorized granulomata as follows:—

- (i) Specific: tuberculous, syphilitic, actinomycotic.
- (ii) Those occurring under Meck's conditions: sigmoid diverticulitis, leaking gastric ulcer, perforation of small gut by a foreign body, trauma from surgical accident, mesenteric injuries, injuries to the intestinal wall, e.g. released strangulated hernia.
- (iii) Regional enteritis (Crohn's disease).

He considered that the ætiology of (iii) was obscure but bacterial. Pathologically, both small intestines and colon are affected.

The initial lesions are held to be small mucosal ulcers, and thence by a gradual spread of inflammation involving all coats of the bowel to the typical appearances met at operation. The affected length of gut feels like a soft rubber hose pipe or "heavy bodied snake"; the whole wall is thickened and the lumen hard to define. There is often a sharp demarcation between normal and abnormal bowel. Microscopically there are marked inflammatory, necrobiotic, hyperplastic, exudative and reparative changes; giant cells are often seen.

Young male adults are affected predominantly, but the condition occurs in females and at ages from 4½ to 60 years.

The most difficult aspect of differential diagnosis is to exclude that form of ulcerative colitis which affects only the cæcum, and here a barium enema may help.

Before leaving Lick's classification and observations, amœboma of the bowel and its response to emetine should be mentioned.

Treatment

This resolves itself into a choice between excision of the diseased part or parts of gut and a short-circuit operation to relieve obstruction. While the latter relieves obstruction it does not necessarily mean that the inflammation will resolve; in fact there is ample evidence that the disease may progress along the bowel either proximally or distally, and eventually involve the site of short-circuit and its stoma.

Excision is therefore the treatment of choice, and ability to perform it is governed by (*a*) a correct pre-operative diagnosis; (*b*) the extent and state of the disease; and (*c*) the condition of the patient. Correct pre-operative diagnosis is stressed since, as has been seen, the clinical diagnosis is often missed, but a correct clinical diagnosis will enable suitable operative preparation, approach and technique to be planned. The point of the extent and state of the disease explains itself, as does largely the condition of the patient.

In the presence of incomplete obstruction and with an ill patient a short circuit operation is often preferable to excision.

CONCLUSION

Professor Mecluer's case is interesting in that it shows characteristic ileitis causing obstruction in a man with a recent history of strangulated or incarcerated hernia; that the significance of the "string sign" was certainly overlooked by the writer; and that in the presence of some degree of obstruction an ileo transverse colostomy was performed.

My thanks are due to Professor Mecluer for allowing me to study this case and to assist him at operation; to the librarian of the King Edward VII Medical College, Singapore, for his kindness in producing the references listed below; and to Surgeon Vice-Admiral Colson, Medical Director-General of the Navy, for permission to submit this account for publication.

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A CASE OF WASTING OF THE SMALL MUSCLES OF THE HAND DUE TO A TOXIC NEURITIS FOLLOWING SULPHONAMIDE TREATMENT.

BY

Surgeon Lieutenant-Commander L. G. TOPHAM, R.N.

THE following case is considered to be of sufficient interest to justify publication, as it adds yet another cause to the many more common ones of "wasting of the small muscles of the hand."

The patient, a rating aged 26, had a toxic neuritis probably due to sulphapyridine taken during an attack of pneumonia, causing wasting of the small muscles of the right hand with loss of power; this was still present eighteen months later though to a less degree.

[illegible]

[illegible] alive [illegible] and 26 [illegible] Has [illegible] all well. Wife aged [illegible]

[illegible] in childhood [illegible] two [illegible] in January 1945 [illegible] to a Royal [illegible] of numbness [illegible] above the wrist [illegible] in the hand so [illegible] had difficulty in [illegible] He was treated with [illegible] unknown) for [illegible] that time the [illegible]

[illegible] carried out all duties [illegible] in cold weather when [illegible]

[illegible] there was wasting of the [illegible] months in the tropics [illegible] the United Kingdom in [illegible] and he thought [illegible] such as watch [illegible] with his right [illegible]

[illegible] had experienced [illegible] No further paraesthesia [illegible] When his hand felt [illegible] the attack [illegible] he still had normal [illegible] hand [illegible] distinguish differences in [illegible] He had [illegible] twitchings in the muscles [illegible] Raynaud [illegible] His chest had been [illegible] the last time being in April 1945 when no abnormality could be found.

[illegible] handed.

[illegible] 1946). [illegible] well built and well nourished.

[illegible] Nothing abnormal detected.

[illegible]—Cranial nerves. Left side of mouth moved better than right [illegible]

[illegible] of both arms was equal. Circumference of forearms [illegible] right 25 cm. and left 25.3 cm. Tone of right arm [illegible] that of the left. [illegible] both shoulder and elbow joints [illegible] about equal on both sides.

[illegible] There was slight weakness of dorsiflexion of right [illegible] wrist was weaker than that of left. Supination and pronation on [illegible] weaker than on the left.

[illegible] was marked wasting of the thenar and hypothenar eminences and of [illegible] of the right hand. The power of the flexors and extensors of the [illegible] The interossei were very weak as was the opponens pollicis, but [illegible] the abductor pollicis was very good compared with that of the other small [illegible] hand.

Lower limbs. [illegible] tone and power very good.

Reflexes. Biceps more active on the right side. Both triceps diminished but equal. Supinator jerks could not be elicited. Hoffmann [illegible] reflexes showed no abnormality.

[illegible] reflexes all present but upper left [illegible] sluggish [illegible] ankle jerk present [illegible] response was [illegible]

[illegible] normal [illegible] light touch [illegible] the summit [illegible] [illegible]

[illegible]

[illegible]

CONCLUSION

Although during the past four to five months the condition had been improving and the patient now had fairly good power there was still marked wasting of the small muscles of the hand eighteen months after the original complaint. It is most likely that the condition was caused by sulphapyridine therapy producing a toxic neuritis with particular selectivity although at many stages in the illness a diagnosis of motor neurone disease of the atrophic type had apparently been considered a strong possibility.

ACKNOWLEDGMENTS

My acknowledgments are due to Surgeon Captain C. H. M. [illegible] R.N. (Rtd.) and to the Medical Superintendent of Bangour E.M.S. Hospital for permission to publish these notes.

RAT-CATCHING

SURGEON LIEUTENANT M. P. GRANVILLE, R.N., has sent the following description (with diagrams) of a rat trap which has been found very successful at the C.H.U., R.M., Faringdon, Berks.

The trap consists of a bucket half full of water, the top being covered with strong brown paper lashed on like a drum skin. A crucial incision is made in the paper, the outer ends of the incision being not more than three inches from the edge of the bucket and the point of intersection being in the centre. Bait such as grated cheese or oatmeal is *stuck* on to the paper in the middle (so that the apex of each quadrant holds some) and a board placed against the rim of the bucket to act as a runway, a little bait being scattered on it.

Rats attracted by the bait run up the runway and on to the paper and when they walk out to the bait in the centre fall into the bucket and are drowned. The paper, being strong and springy, springs into its original position and gives a false impression of solidity. Since the bait is stuck on the paper this does not have to be renewed every time. Many rats may thus be caught in the same trap without resetting it. It is simple and costs nothing.

Reviews

THE SHIP CAPTAIN'S MEDICAL GUIDE Ministry of War Transport Eighteenth Edition Pp 225 London H M Stationery Office Price [illegible]

The seventeenth edition of this book was issued in 1929 and the outbreak of the late war prevented the present edition being compiled earlier A considerable amount of material has been taken from "First Aid in the Royal Navy" (1943)

There is a fine nautical flavour about many of the descriptions of diseases and we were particularly amused to read about symptoms of appendicitis being referred to the south west corner of the abdomen

On the whole this is a reliable guide to the treatment of diseases by the layman who has a limited medical knowledge but we would suggest that the article on appendicitis requires revision and that the name "castor oil" be banished entirely in any description of this disease

TEXTBOOK OF MEDICINE By various writers Edited by Sir John Conybeare, *K B E M C* D M Oxon F R C P Eighth edition 1946 Pp 1170 25 illustrations 31 X-ray plates Edinburgh E & S Livingstone Ltd Price 30s 6d

It is indeed pleasant to welcome a further edition of this excellent textbook, and the frequency of new editions shows how alive are Sir John Conybeare and his team of contributors to the recent developments and advances in medicine

This book may not in size or spacious detail rival an Osler a Price or a Cecil, but it is outstanding as a textbook for students general practitioners and others who wish to have the most essential facts put before them fully but in a concise and easily assimilated manner

The table of "Physiological normals" inside the front cover will please the heart of many a busy doctor or harassed student while the appendices—especially that on aviation medicine and air sickness—should prove most useful in these days of flying at great speeds and high altitudes when a knowledge of these matters is so essential The section on tropical diseases has been brought up to date and those on psychological medicine and on skin diseases are decided assets as is the new contribution on penicillin

The print is of good size the diagrams and films are well produced and indeed, the book can be well recommended as a very useful work of reference for Service medical officers and others

PRACTICAL POINTS IN PENICILLIN TREATMENT By G E Beaumont, D M F.R C P, Physician to the Middlesex Hospital, and K N V Palmer B M M.R C P Acting Medical Registrar to the Middlesex Hospital 1946 Pp 16 London J & A Churchill Ltd Price 1s 6d

This small brochure of 16 pages contains up-to date information on all matters connected with penicillin therapy It is presumably written for doctors who have not had the opportunity of studying the administration of penicillin in hospitals, but it will be of interest also to many of those who have.

Lists of sensitive and insensitive organisms are given with concise and clear descriptions of the best way to tackle each injection and the most appropriate preparation to use. A lot of useful information within a very small compass.

SURGERY OF THE HAND. By R. M. Handfield-Jones, M.C., M.S., F.R.C.S., Surgeon to St. Mary's Hospital; Senior Surgeon, Florence Nightingale Hospital; Consulting General Surgeon, Hospital for Women, Soho Square, &c. Second Edition. August 1946. Pp. 164. 104 illustrations including many in colour. Edinburgh: E. & S. Livingstone Ltd. Price 30s. 0d.

The second edition of this well known book—which is dedicated to the memory of the late Professor Allen B. Kanavel and to casualty house surgeons past, present and future of St. Mary's Hospital—has appeared just under six years since it was first published. It has now been brought right up to date and the section on infection altered in the light of recent advances in treatment by the sulpha group of drugs and by penicillin. Chapters have been added on amputations and burns but the author has very wisely resisted the temptation to enlarge that section which deals with congenital and acquired defects and tumours, as the book is written primarily for the busy practitioner and casualty surgeon who have little time to spare over academic details, and who want to know quickly, concisely and accurately how to treat the damaged hand.

Throughout the volume it is easy to see with what care and thought it has been prepared, and the whole book is beautifully produced and illustrated on fine glossy paper.

Every day we still see cases of injury to and infection of the hand which have been treated inadequately, and it is tragic to contemplate that such a state of affairs should exist when men like Kanavel and Handfield-Jones have laboured hard and long to teach generations of surgeons how to avoid those mistakes which lead to the crippling of "one of the most beautifully designed instruments in the world."

Naval surgeons see as many septic and injured hands as anyone else and while many may feel they know quite enough about the subject we feel that even the most expert will learn something useful from this book. We recommend it unreservedly to all our readers who may be called upon to treat the damaged hand.

SYNOPSIS OF SURGICAL ANATOMY. By A. Lee McGregor, M.Ch.Edin., F.R.C.S.Eng., Surgeon, Johannesburg General Hospital; Lecturer on Surgical Anatomy, University of Witwatersrand. Sixth Edition. 1946. Pp. 714, illustrated. Bristol: John Wright & Sons Ltd. Price 25s. 0d.

Six editions with several reprints in the space of fourteen years gives some indication of the popularity of this invaluable book. Professor Raymond

Dart in an introduction gives some figures which will delight the medical Ripley. Some 200 different bones, 300 ligaments, 500 muscles and 40 nerves ultimately separating into hundreds of branches help to perplex the unfortunate student of anatomy. When one adds to this the myriad of named arteries, veins and lymphatics, the organs of special sense, the brain and the viscera, one can well understand the state of mind of the newly qualified who desires to retain in his memory those anatomical facts which may be necessary for his future work.

In producing this volume the Editor has avoided the standard routine as laid down in classical textbooks and has confined himself to presenting anatomical facts of practical value. Although he states in his preface that the book is intended for the senior student and practitioner, we can vouch for the interest and value to be found in its pages by the specialist surgeon as well.

Practically every page is illustrated with diagrams and each chapter is complete in itself. We know of no book on such a dry subject which gives so much pleasure and interest to its readers. Although some additions have been made to the previous edition, the book remains of handy size, and it is printed on good paper and strongly bound.

Although reluctant to burden the naval surgeon with another tome in his already crowded library space, we feel that he will derive so much pleasure from this book that it will well repay him to add just one more.

THE PATHOLOGY OF TRAUMATIC INJURY. A General Review. By James V. Wilson, M.D., M.R.C.P.(Lond.), Major, R.A.M.C.(T), Pathologist to Harrogate and District Hospital and the Royal Bath Hospital, Harrogate, late D.A.D.P. Malta Command (1940-44). First Edition, 1946. Pp. 192, 61 illustrations. Edinburgh: E. & S. Livingstone. Price 20s. 0d.

The subject of this monograph is of paramount importance to the naval doctor whatever his particular bent, and it has been handled throughout in a masterly and comprehensive manner, yet with clarity and understanding of the clinical approach.

The author apologizes for the scantiness of his references due to writing whilst abroad during the late war, but I think he should rather be congratulated on the width and scope of his reading. Though there are really very full references to the literature of his subject, he has managed, as he says in his preface—to deal with essentials rather than to give a mass of irrelevant facts. While discussing much that the pathologist may be thankful to have brought succinctly to his notice again, this book is equally one for the busy general practitioner or for the student.

The section on the pathology of burns may be picked out for special mention. The importance of pulmonary damage when extensive burns are sustained in a confined space, as may happen in ships from time to time, is given due prominence in a very clear account of the local and general lesions. The author's new classification of burns into three types—Type I, epidermal burns; Type II, dermo-epidermal burns; Type III, deep burns—has much to recommend it on practical grounds and may well displace Dupuytren's classification by degrees.

The publishers are to be congratulated on the beautiful reproductions of the 61 illustrations, a number of them very clear and instructive photomicrographs of valuable original preparations. The whole set up of the book has a "pre-war" quality all too rare at present. It is a pleasure to have the opportunity of praising this excellent little book, whose author was well known to the reviewer in the Mediterranean during the earlier stages of the late war as a very competent and energetic clinical pathologist.

PRACTICAL ANÆSTHETICS. By H. Parry Price, M.R.C.S., L.R.C.P. First Edition. 1946. Pp. 137. [illegible] illustrations. Bristol: John Wright & Sons Ltd. Price 12s. 6d.

Surgeon Captain Parry Price, R.N.V.R., has written an excellent book which is recommended to all anæsthetists about to take up junior anæsthetic appointments. Every page is full of information, much of which would otherwise have had to be extracted from articles and monographs of the last fifteen years.

As with all books of this type there is a tendency to fall between two stools, the necessity for making a brief and sometimes dogmatic statement without a complete explanation as to why a particular technique or drug should or should not be used. Although much information is included it is felt that causes of such conditions as respiratory obstruction and indications or contra-indications for certain drugs and techniques might well be tabulated for easier assimilation. In dealing with anæsthetic complications the author is much to be admired for including practical examples. Some criticism can be levelled in that, in dealing with pulmonary complications, no post-operative preventative measures are mentioned and no treatment advised when such occur.

The present reviewer agrees entirely that the nitrous oxide oxygen, or air with a pentothal induction, is the most difficult anæsthetic to give, but he is not certain that the author has made it quite clear that more often than not it is necessary to add either ether, cyclopropane or trilene to obtain surgical anæsthesia without anoxia. Perhaps more space might have been given to curare as it bids fair to replace spinal anæsthesia in hospital practice.

An excellent book which has been well produced with good illustrations.

ILLUSTRATIONS OF ANATOMY FOR NURSES. By E. B. Jamieson, M.D., Senior Demonstrator and Lecturer Emeritus, Anatomy Department, University of Edinburgh. Second Edition. 1946. 64 coloured plates. Edinburgh: E. & S. Livingstone Ltd. Price 8s. 6d.

Dr. Jamieson's illustrations of regional anatomy are deservedly popular among medical students for clarity of presentation and for the high standard of their illustrative plates. The quality of the illustrations in this small book fall in no way below this standard, though there has been necessarily considerable compression of subject matter.

Perhaps more stress could have been laid on aspects of surface anatomy in a volume intended for nurses' reading, especially in the plates dealing with cranial topography. More space might also have been allotted to limb anatomy. In general, however, the book fulfils admirably its purpose of pictorial representation of the more important aspects of descriptive anatomy without undue emphasis on minor details.

An Introduction to Bacteriological Chemistry. By C. G. Anderson, Ph.D. Birm., Dip. Bact. Lond., Formerly Lewis Cameron Teaching Fellow, Bacteriology Department, University of Edinburgh. Second Edition. 1946. Pp. 500. Edinburgh: E. & S. Livingstone Ltd. Price 20s. 0d.

This is a revised edition of the first book, which appeared in 1938, and includes many of the advances which have been made in the subject since that date. The main difference between the two books is the inclusion of chapters on the chemotherapy of bacterial infections and on antibiotics. New material has been added to a number of other chapters to bring them up to date.

The textbook was produced originally for students taking the Diploma of Bacteriology of the University of London, or bacteriology as an honours subject in the University of Edinburgh. It is clearly written and combines in one book a lot of material which up to the present could be found only in various scattered monographs.

Bacteriological chemistry is a rapidly expanding subject, and there is a definite need for a textbook of this description. Although much of the information it contains is not necessary for anyone doing routine clinical bacteriology, it is essential for those specializing in the subject or intending to do research work.

Case Studies in the Psychopathology of Crime. Vol. II. By Ben Karpman, M.D., Senior Medical Officer and Psychotherapist, St. Elizabeth's Hospital, Washington, D.C. First Edition. 1944. Pp. 738. Washington: Medical Science Press. Price $16.00.

Giving the life histories in autobiographical form of four habitual criminals under psychiatric observation, the early childhood memories are assisted by extensive dream association. The whole presents a fascinating, if somewhat restricted, review of environmental influences on crime and the criminal in America over the last forty years, and might well be described as a knock-out blow to any lingering doubts on the effectiveness of punitive imprisonment alone in the prevention of crime.

With blunt descriptions of personal reactions to sex, sadism and drug addiction, it is not a book for the squeamish, but should be read by all interested in sociology as an antidote to wishful thinking.

A large, well turned-out book of sombre appearance suited to the subject, with a good index.

A Manual of Tomography. By M. Weinbren, B.Sc.(S.A.), M.R.C.S.Eng., L.R.C.P.Lond., F.F.R.Lond., D.M.R.E.Camb., Lieutenant Colonel, S.A. Med. Corps; Adviser in Radiology, Union Defence Forces; Radiologist, Chamber of Mines Hospital, Johannesburg; Assistant Radiologist, the Middlesex Hospital, &c. First Edition, October 1946. Pp. viii + 270, 397 illustrations. London: H. K. Lewis & Co. Ltd. Price 45s. 0d.

Tomography can be defined as "a method of Roentgenographic projection of plane sections of solid objects" (Andrews, 1936) and has been in operation for over a decade. Primarily this method of radiography was applied mainly to the examination of lung pathology, but its scope has now been enlarged to include many other organs and joints in the body where overlying structures make accurate demonstration of injury or pathology difficult. Tomography has thus made X-ray interpretation of deep pathology much more certain both quantitatively and qualitatively to the mutual advantage of the patient and of the surgeon or physician concerned.

The author has in a relatively small book demonstrated by means of excellent reproductions and illustrative cases the increasing field of tomographic work. While this is not a complete survey of the field in all its details, a table of references is included which lists the literature on the subject. Of particular value is the concise section at the end of the book giving in 15 pages the technical details, which will be of great value to those radiologists whose department is fortunate in having a tomograph installed.

While this book is mainly for the use of the radiologist, it will be of interest to the physician and surgeon in outlining the increasing scope of tomography, and the numerous reproductions will help them to understand the interpretation of tomographic films of their own cases.

The typescript is large and clear, the illustrations well reproduced, and the volume well bound and presented. This book should be a valuable contribution to radiological literature.

Spanish-English Medical Dictionary. Compiled by M. McElligott, F.R.C.S.Ireland, D.P.H., Sometime Regional Medical Officer, Ministry of Health. Veterinary supplement compiled by Isobel W. Brocklehurst, M.R.C.V.S., of the Department of Veterinary Pathology in the University of Liverpool. 1946. Pp. viii + 250. London: H. K. Lewis & Co. Ltd. Price 12s. 6d.

This little volume has been published—to quote the compiler—"after many years of quest for Spanish equivalents of English medico-surgical terms." He invites all who consult it to apprise him of any lacunae which they may observe and welcomes their criticism.

It is published in a handy pocket size and is strongly bound to withstand the wear and tear of constant reference. This should prove of great value to those needing to consult the medical literature of the Spanish-speaking countries. The veterinary supplement also is comprehensive.

We acknowledge with thanks receipt of the following publications:—

Anales de la Facultad de Medicina de Montevideo. Indian Medical [illegible] Bibliographical Bulletin. British Legion News Flashes and [illegible]. *British Medical Bulletin. British Medical Journal.* The Broad Way (Westminster Hospital). *Bulletin International des Services de Santé des Armées. Clinical Journal. Guy's Hospital Gazette. Hospital Corps Quarterly. Indian Medical Gazette. Journal of the Medical Association of Eire. Journal of the Palestine Arab Medical Association. Journal of the Royal Army Medical Corps. Journal of the Royal Naval Scientific Service. Journal of the Royal Sanitary Institute. Journal of V.D. Information. League of Nations Bulletin of the Health Organisation. Liverpool Medico-Chirurgical Journal. London Hospital Gazette. Medical Journal of Australia. Medical Press & Circular. Middlesex Hospital Journal.* The Military Surgeon. *Proceedings of the Staff Meetings of the Mayo Clinic.* The Quartz Lamp (Hanovia Ltd.). *Revue de Médecine Navale. St. George's Hospital Gazette. St. Mary's Hospital Gazette. St. Thomas's Hospital Gazette. Tropical Diseases Bulletin. United States Naval Medical Bulletin. University of Durham Medical Gazette. West London Medical Journal.*

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News of the Service

It is proposed to introduce a new section into the Journal, this to consist of news items to cover the social, sporting and professional activities of medical officers, nursing sisters, sick berth staff and V.A.D.s, and such news items are invited by the Editors from medical officers and others throughout the world. It is also thought that up-to-date information about living conditions and travel on overseas stations would be of great interest to present and, it is hoped, future subscribers.

Every endeavour is being made to speed up production of the Journal and it has now been approved to reintroduce the section reproducing relevant A.F.O.s, a selection of which appears in this issue.

BRITISH MEDICAL ASSOCIATION.

The Medical Officer in Charge and medical officers of R.N. Hospital, Haslar, entertained the members of the local branch of the British Medical Association to dinner in the medical mess on 20th March.

In a short speech after dinner, Surgeon Rear-Admiral O[illegible] pointed out that this celebrated the reintroduction of a function which unfortunately had been interrupted by the recent war. Mr. F. Cowper Taplin replied for the guests.

It is hoped to revert to the old custom of making this a regular annual feature.

ADMIRALTY FLEET ORDERS

A.F.O. 213.—*Penicillin in the Treatment of Syphilis in the Royal Navy.*

(M.D.G. 1009/47.—17th Jan. 1947.)

The treatment of syphilis with penicillin may now be carried out in R.N. hospitals, auxiliary hospitals, sick quarters and hospital ships in which a genito-urinary specialist [illegible] logical control can be [illegible]. With the exceptions [illegible] all cases are to be discharged to the care of a G.U. [illegible] other than local treatment of the lesion, which should be [illegible] *In the case of large shore establishments [illegible] considerable administrative [illegible] to discharge all patients suffering from syphilis [illegible] Medical Director-General of the Navy for permission [illegible]. Such application should be accompanied by [illegible] able to treat cases locally [illegible] tests (blood and C.S.F.) [illegible] it is proposed to admit* [illegible]

[illegible] in which the blood [illegible] the Maple [illegible] in accordance [illegible] prior to their discharge to the care [illegible]

(b) [illegible] treatment with [illegible] which if the case cannot be discharged [illegible] diagnosis.

(c) [illegible] completed [illegible] treatment has been [illegible] relapse [illegible] at the [illegible] treatment.

(d) All [illegible] C.U. specialist before [illegible]

(e) All [illegible] C.U. specialist for [illegible]

[illegible] the [illegible] that [illegible] are to be [illegible] S.576 (S) and [illegible]

[illegible]

Date [illegible]

The following [illegible]

Surveillance

(i) *Duration* [illegible] for months [illegible] referred [illegible] the [illegible] At the end [illegible] specialist.

(ii) *Blood* [illegible] quarterly [illegible] W.R. can [illegible] month [illegible] hospital [illegible] all cases [illegible] be performed.

(iii) *C.S.F. tests* [illegible] months and again at about the eighth [illegible]

(iv) *Results* of all blood, C.S.F. [illegible] are to be recorded on forms S.576 (S) and S.5[illegible] by reference sheet to the M.O.I.C. *Navy Wing* [illegible] *Cosham Hants* and to the original establishment.

(v) [illegible] to become or remain [illegible] the case is to [illegible]

(vi) [illegible] and cured without [illegible]

(6) What [illegible] be followed at home [illegible] necessary [illegible] conditions the need for regular reliable [illegible] cannot be overstressed.

[illegible]) With [illegible] the drafting category in the [illegible] commencement of treatment until seen by [illegible] and may then be raised to [illegible] in the case of officers [illegible] three successive negative [illegible]

7 [illegible] being drafted [illegible] shown on his form S.57 [illegible] officer in order that [illegible] the draft. The rating [illegible] paragraph [illegible] that if necessary he [illegible]

[illegible] relapse at any stage of treatment [illegible] consultation at the first [illegible]

[illegible] patient [illegible] S.57a (2) [illegible] 15) [illegible]

[illegible] The [illegible] of imp[illegible] vital import[illegible] tests ar[illegible] should [illegible] emphasised [illegible] the med[illegible]

7 [illegible] new arr[illegible] new arr[illegible] is required [illegible] R.N. Hospital [illegible] with all [illegible]

8 [illegible] Medical [illegible] Hospital [illegible] is Advis[illegible] the Medical Director General [illegible] venereal diseases may comm[illegible] establishment in which the [illegible] treatment of these [illegible]

([illegible])

A.F.O. 274.—[illegible]

[illegible]—28th Jan. 1944.)

The R.N. Air Medical School [illegible]

(i) The instruct[illegible] the principles and practice of medicine as applied [illegible]

(ii) The instruction [illegible] in such medical subjects [illegible] for the proper performance of their duties connected with naval aviation.

(iii) To apply medical knowledge to the solution of aviation problems in the naval service.

3 [illegible] *Equipment School*.—(a) The school [illegible] at the same [illegible] Equipment School and will work in close co-operation with [illegible] the Air Medical School and the Safety Equipment [illegible].

4 [illegible] *requirements*.—The commanding officer of the [illegible] station at [illegible] authority to deal direct with the following on technical [illegible]:—

Medical [illegible]
[illegible] Equipment
[illegible] Air Welfare
[illegible] Victualling
[illegible] Developments and Production
[illegible] R.N. Medical Research Institute (when the school becomes [illegible])

[illegible] to be dealt with through the normal service channels.

[illegible] medical officer will [illegible] as required by [illegible] Admiral (Air). For this purpose he will be required to visit air stations and aircraft carriers [illegible] Admiral (Air) [illegible] and keep in touch with current flying problems. He is to maintain close liaison with the R.A.F. Institute of Aviation Medicine through the [illegible] officer attached to that institute.

5 *Courses for medical officers*.—It is the intention that [illegible] to each aircraft carrier and at each naval air station should hold [illegible] the Air Medical School. For this purpose medical officers [illegible] possible [illegible] appointed for the course by the Admiralty, who will make suitable arrangements with Admiral (Air). Should it not be possible for the medical officer [illegible] to undergo the course before taking up their duties, it is the responsibility of the [illegible] officers to make the necessary arrangements direct with the Admiral (Air), the [illegible] the course being reported to the Admiralty.

6 The air medical course will cover the following [illegible] syllabus:—

(a) Anoxia
(b) High altitude flying
(c) Acceleration
(d) Supersonic speed
(e) Day and night vision
(f) Clothing and equipment
(g) Aircrew welfare and comfort
(h) Survival
(i) Examination for fitness for flying
(j) Accident prevention

7 *Courses for executive officers*.—A special short course of three days' duration for Commanding Officers, Commanders (Air), Commanders (Flying) and Squadron Commanders is given in conjunction with the Safety Equipment School in matters appertaining to the duties of these officers in air medicine and safety equipment. Full details of this course are given in Syllabus of Miscellaneous [illegible] Courses No. 5 Part II (issued by Admiral (Air)).

8 *Instruction for ratings*.—No special courses are [illegible] for ratings, but officers of the School of Air Medicine will give lectures on subjects such as [illegible] and flying clothing to air category ratings when required by Admiral (Air).

9 *Investigations and new problems*.—Problems requiring investigation or new methods to be tried by the research and development section of the school will be referred to the Air Medical School in one of the following ways:—

(i) Admiralty requirements will normally be passed to R.N. Medical Research Institute. If it is considered that the requirements are such as could be satisfactorily investigated at the Air Medical School, they will be forwarded to this establishment through Admiral (Air).

(c) Ma[illegible] ...al air stations or carriers in Admiral (Air)'s Command [illegible] ...municated through the administrative authority thence to Admiral (Air).

(d) Matters [illegible] by the Air Medical School either from their own [illegible] at R.A.F. Institute of Aviation Medicine are to be reported [illegible] Admiral (Air) with a copy for Medical Director General.

II. [illegible] investigations on the above subjects are to be undertaken [illegible] Admiral (Air) after consultation with the Medical Director General.

(A.F.O. 661/45 is cancelled.)

A.F.O. [illegible] *Entry into Sick Berth Staff—Encouragement in Duties*

(M.D.G. 1668/46.—24th Jan. 1947.)

Many [illegible] ...nal into the Sick Berth Staff selected under the Armed Forces [illegible] ...ts.

2. [illegible] ratings every help and encouragement in their work and explain [illegible] the experience gained as Sick Berth Staff will be of assistance [illegible] ...ilian duties but also after they have become [illegible]

A.F.O. [illegible] *H.M. Ships. Instruction of Ratings in the [illegible] Service Afloat X-ray Unit*

(M.D.G. 8283/46.—24th Jan. 1947.)

[illegible] a portable X-ray unit has been supplied is to [illegible] Sick Berth Staff is familiar with its operation.

2. [illegible] the X-ray work done on board under the [illegible]

3. [illegible] should arrange for the rating selected to undergo [illegible] ...ment of ten weeks duration in the use of the [illegible] Naval hospital. He should be given facilities for [illegible] after joining. If for any reason this cannot [illegible] it should be done at the first available opportunity. [illegible] medical officer [illegible] make arrangements for the course of instruction [illegible] in paragraph 3 [illegible] be considered necessary.

A.F.O. 539. *Transport [illegible] of Invalids—Categorization*

(M.D.G. [illegible] 46.—14th Feb. 1947.)

1. [illegible] facilitate the [illegible] of invalids arriving in home ports to [illegible] hospitals the [illegible] included in paragraph 4, which is used by the [illegible] Medical Service, is to be used.

2. [illegible] ...lids to be disembarked should be addressed [illegible] ...Command and repeated to Medical Director General, [illegible] Naval [illegible] and to Medical Officer in Charge, R.N. Hospital, [illegible] Medical Transport Officer.

3. The categorization [illegible] provide the information required by commanding officers of H.M. ships [illegible] duties to enable them to allocate accommodation [illegible] and appropriate [illegible] ...tions should be inserted into local station orders to cover this requirement. [illegible] that a note should be included indicating that such categorization [illegible] ...ing numbers of invalids for disembarkation either at a home port or [illegible] military hospital abroad and in such cases the categorization shown in paragraph 4 [illegible] is always to be followed.

4. The signal should [illegible] numbers of invalids for disembarkation under the following headings:—

Category one:—

(a) M (number) S (number) Special (see legend) (number)
(b) M (number) S (number) Special (see legend) (number)
(c) M (number) S (number) Special (see legend) (number)
(d) M (number) S (number) Special (see legend) (number)

[illegible]

[illegible]

OBITUARIES

SURGEON CAPTAIN [illegible] Born [illegible] died on 21st November 1946. Born [illegible] March 1864 [illegible] qualified [illegible] in 1889. He entered the R.N. Medical Service as Surgeon on 21st [illegible] 1890, was promoted to Staff Surgeon on 21st February 1898, and to Surgeon C[illegible] 21st February 1906. He saw Service during the 1914-18 war and was placed on the Retired List in the rank of Surgeon Captain on 4th July 1919.

SURGEON CAPTAIN J. BONIDAS [illegible] died on 15th January 1947 [illegible] Born [illegible] January 1880 [illegible] qualified in 1905. Entering the R.N. Medical Service in February [illegible] he was promoted to Surgeon Lieutenant-Commander on 10th August 1913 and to Surgeon Commander on 1st February 1918. He was placed on the Retired List in the Rank of Surgeon Captain on 10th January 1930.

Mobilized on 28th July 1939 Surgeon Captain Bonidas reverted to the Retired List on 26th February 1941.

SURGEON CAPTAIN A. C. [illegible] died on 21st November 1946 at Exmouth. Born in 1883 he qualified at St. Thomas's Hospital in 1905. Entering the R.N. Medical Service on 9th November 1908 he was promoted to Surgeon Lieutenant Commander on

5th November 1915 and to Surgeon Commander on 5th N[illegible] and to Surgeon Captain on 31st December 1932. He was placed on the [illegible] List (ill health) on 23rd February 1934. Surgeon Captain Valpy French [illegible] for duty [illegible] and appointed for duty with A.S.C.B.S. He reverted to the Retired List (ill health) in September 1944. G. [illegible] who served under him writes:—

Surgeon Captain Valpy French had an intimate knowledge of the Service and of his profession. As an officer he was a strict disciplinarian but one who was always most easy to approach, and he was held in very high regard by all who came in contact with him.

His duties [illegible] Medical Officer were perhaps his *métier*, and there is little doubt that the work that he put in while serving in H.M.S. *Nelson* did much to [illegible] in 1932. Any medical problem or administrative problem was met with a [illegible] definite answer. His efficiency was almost [illegible] but such [illegible] at the [illegible] was readily [illegible] the anxiety of those who might be [illegible]. As P.M.O. he [illegible] the importance of the medical officer [illegible] in ships rightly [illegible] that the hospitals were but adjuncts to the sea-going service. The [illegible] was judged [illegible] What medical officers did in hospitals [illegible] from the nature of things [illegible] Who had greater right to judge us than our patients.

On promotion Surgeon Captain Valpy French was appointed to the Royal Naval Hospital, Malta, an appointment unhappily that he was not long to [illegible], for ill health led to his being invalided home within the year. He and his family had taken an active part in the life of the hospital and they were greatly missed by all [illegible] who served with them there. He was placed on the retired list [illegible] in February 1934, but it came as no surprise to his many friends [illegible] that [illegible] love for the sea had taken him afloat again and that he [illegible] in the Elder and Fyffe Line.

The recent war saw him mobilized for duty with the Admiral Superintendent for Contract Built Ships. His duties in this respect, involving much climbing about on ships under construction, proved too much for his failing heart and he was reverted to the Retired List in September 1944. He had been in poor health for some time before he died at his home in Exmouth.

SURGEON COMMANDER C. H. RICE, R.N., died on 11th March 1947 at Hambledon. Born in 1868 he qualified in 1891 and entered the Royal Navy as a Surgeon in May 1893. He was promoted to Staff Surgeon in May 1903 and to Surgeon Commander in May 1909. He served during the first World War, being placed on the Retired List at his own request in August 1920.

SURGEON COMMANDER C. B. FAIRBANK, R.N., died on 23rd February 1947 at Canford Cliffs. Born in 1874 he qualified in 1898 and entered the Royal Navy as a Surgeon in the same year. He was promoted to Staff Surgeon in May 1906 and to Surgeon Commander in May 1910. He served during the first World War and was placed on the Retired List in July 1919.

SURGEON LIEUTENANT COMMANDER N. M. MCARTHUR, R.N., died suddenly at his home in London on 24th February 1947. He had been in ill health for about two years.

Born in June 1908 in Ontario, Canada, he qualified in 1932 at the University of Western Ontario. After qualifying, he held appointments as Attending Physician to the May Court Convalescent Home, Ottawa, and to the Red Cross Clinic, Ottawa. In July 1936 he made a voyage as medical officer to the Canadian Government Eastern Arctic Patrol. He entered the Navy as a Surgeon Lieutenant, R.N., on 16th October 1936, with seniority ante-dated to October 1935; promoted to Surgeon Lieutenant Commander in October 1941. T. A. T. writes:—

Neil McArthur was primarily a physician with leanings towards pathology. He served as bacteriologist at R.N.A.H. Sherborne and later in the *Tjitjalengka*, leaving that appointment [illegible] senior medical officer of [illegible] Service where he [illegible] acting rank of Surgeon [illegible] to the Medical Department [illegible] January 1946 where he [illegible]

Neil McArthur [illegible] was known to a large [illegible] be greatly missed. He [illegible] and unassuming and [illegible] as realized. Although [illegible] older than most of [illegible] person one would ask about when meeting [illegible] lamented.

HONOURS

Knight of the Venerable Order of St. J[illegible]

Surgeon Vice Admiral H. St. C. Colson, C.B.E.

C.B.

Surgeon Rear Admiral H. R. B. Hull, K.H.S.

M.B.E.

Wardmaster Lieutenant L. C. Birch, R.N.

A.R.R.C.

Miss S. K. I. Richard, Acting Senior Sister, Q.A.R.N.N.S.
Miss G. M. Arthur, Nursing Sister, Q.A.R.N.N.S.

DEGREES

M.D. (Cantab.)

Surgeon Commander M. A. Rugg Gunn, R.N.

D.O.

Surgeon Lieutenant Commander A. Daunt Bateman, R.N.V.R.

D.O.M.S.

Surgeon Lieutenant J. A. N. Lock, R.N.
Surgeon Lieutenant R. L. Rees, R.N.V.R.

TRANSFERS TO THE PERMANENT LIST

Surgeon Lieutenant R. W. Simpson transferred to the Permanent List [illegible] date of seniority to 21st July 1943.

Surgeon Lieutenant (D) G. N. Pleasant transferred to the Permanent List [illegible] December 1946 with seniority of 20th August 1943.

Surgeon Lieutenant R. I. John transferred to the Permanent List 14th [illegible] 1947 with seniority of 9th March 1944.

Surgeon Lieutenant R. R. B. Baxendine transferred to the Permanent List 3rd February 1947 with seniority of 31st August 1944.

Surgeon Lieutenant J. S. Ritchie transferred to the Permanent List 11th J[illegible] 1947 with seniority of 24th December 1945.

Surgeon Lieutenant Commander (D) K. A. Johnson transferred to the Permanent List 20th January 1947 with seniority of 28th December 1944.

Surgeon Lieutenant J. Keeling transferred to the Permanent List 1st February 1947 with seniority of 14th June 1945.

WARDMASTER OFFICERS

Acting [illegible] Wardmaster L J Carter	Transferred to Permanent List with seniority as Warrant Wardmaster of 13th November 1946
Acting [illegible] Wardmaster W C Blight	
Acting [illegible] Wardmaster J A Kirby	
Acting [illegible] Wardmaster W T Franklin	
Acting [illegible] Wardmaster H I Waller	
Acting [illegible] Wardmaster A B Weeks	

PROMOTIONS

[illegible] Lieutenant-Commander F B Bradbury R N promoted to Acting Interim [illegible] August 1946

[illegible] Lieutenant-Commander H S Sylvester R N promoted to Acting Interim [illegible] October 1946

[illegible] Lieutenant-Commander E B Caldwell promoted to Acting Interim Surgeon [illegible] 20th September 1946

[illegible] Lieutenant-Commander (D) B I S Popham promoted to Acting Interim [illegible] Lieutenant-Commander (D) 30th July 1946

Surgeon Commander I H Gaussen promoted to Surgeon Captain 31st December 1946

Surgeon Commander I S Rudd promoted to Surgeon Captain 31st December 1946

Surgeon Commander D Duncan *O B E* promoted to Surgeon Captain 31st December 194[illegible]

Surgeon Commander K L C Proctor promoted to Surgeon Captain 31st December [illegible]

[illegible] Lieutenant-Commander B W Pratt promoted to Acting Interim Surgeon [illegible] October 1946

Surgeon Captain C B Brownfield *O B E* promoted to Surgeon Rear Admiral 2nd January 194[illegible]

[illegible] Lieutenant A J Burnett promoted to Acting Interim Surgeon Lieutenant-[illegible] October 1946

[illegible] Lieutenant-Commander R I Allan promoted to Surgeon Commander [illegible] 18th August 1946

[illegible] Lieutenant-Commander D A Horendon promoted to Acting Interim [illegible] 1st August 1946

[illegible] Lieutenant J A N Lock promoted to Acting Interim Surgeon Lieutenant [illegible] September 1946

[illegible] Lieutenant R St C Moore, *D S C* promoted to Acting Interim Surgeon [illegible] Commander 13th August 1946

[illegible] Lieutenant H M Darlow promoted to Acting Interim Surgeon Lieutenant-[illegible] 18th January 1947

RETIREMENTS

Surgeon Vice-Admiral (Retired) Sir Percival T Nicholls released 10th July 1946 [illegible]

Surgeon Captain (Retired) G D G Fergusson reverted to Retired List (M U) 29th November 1946 (Granted W S R of Surgeon Rear Admiral)

Surgeon Captain (Retired) J S Elliot released 1st February 1947

Surgeon Commander (D) L R Armstrong placed on Retired List 28th February 1947

Surgeon Commander S Gay French retired (own request) 22nd November 1946

Surgeon Captain G I Ritchie (Retired) released 16th January 1947

Surgeon Captain F N Britton *O B E* (Retired) released 12th March 1947

Surgeon Captain W F Beattie (Retired) released 11th March 1947

Surgeon Captain R N W W Baldulph (Retired) released 17th February 1947

Surgeon Captain W H Murray (Retired) released (date to be reported)

Surgeon Captain A C N Green (Retired) released 7th March 1947 [illegible] Captain J. L. S[illegible] released 16th March 194[illegible]

[illegible] Captain L. H. W[illegible] reverted to Retired List [illegible]

[illegible] Captain L. H. [illegible] *O.B.E.* released 24th January 194[illegible]

[illegible] Captain C. C. Sp[illegible] (Retired) released 31st March 194[illegible]

[illegible] A. Craig (Retired) released 20th March 194[illegible]

[illegible] Commander H. L. Wallup released 11th March 194[illegible]

Surgeon Vice Admiral Sir Sheldon F. Dudley [illegible] April 1947

Surgeon Captain C. W. Woodhams (Retired) [illegible] April 1947

Surgeon Rear Admiral C. [illegible] *D.B.E.* [illegible] April 194[illegible]

WARDMASTER OFFICERS

Mr. W. S. H. Mapstone, Temporary Acting Commissioned Wardmaster, [illegible] 17th March 1947 (granted War Service Rank of Temporary Wardmaster [illegible])

ENTRY FOR SHORT SERVICE COMMISSIONS

R. S. Bell, L.D.S., entered as Acting Surgeon Lieutenant (D) for Short Service [illegible]

J. J. Houston, L.D.S., entered as Acting Surgeon Lieutenant (D) for Short Service [illegible]

A. J. J. Smith, L.D.S., entered as Acting Surgeon Lieutenant (D) for Short Service [illegible]

A. Rennie, L.D.S., entered as Acting Surgeon Lieutenant (D) for Short Service [illegible]

T. H. Welch, L.D.S., entered as Acting Surgeon Lieutenant (D) for Short Service [illegible]

P. P. Philip, M.B., B.Ch., M.R.C.S., L.R.C.P., entered as Acting Surgeon Lieutenant for Short Service, 7th March 1947

ROYAL NAVAL VOLUNTEER RESERVE

PROMOTIONS

Surgeon Commander C. C. Elliott, *D.S.C., V.D.*, to Surgeon Captain 31st December 1946

Surgeon Lieutenant Commander S. C. Suggit, *V.D.*, to Surgeon Commander 31st December 1946

RETIREMENTS

(Class A Releases—Surgeon Commanders and Above.)

Surgeon Commander T. A. Hampton released Class A 20th January 1947

Surgeon Captain F. L. Cassidi, [illegible] Division R.N.V.R., placed on the Retired List (Age) 20th December 1946

Surgeon Commander D. W. Bastings released 28th April 1947

Surgeon Commander H. M. Willoughby released 4th May 1947

EXTENDED SERVICE COMMISSIONS

Temporary Surgeon Lieutenant (D) W. Hall four years Extended Service Commission [illegible] 23rd December 1946

Temporary Acting Surgeon Lieutenant Commander M. J. [illegible] four [illegible] Extended Service Commission 1st June 1946

Temporary Surgeon Lieutenant (D) A. I. Carlton four years Extended Service Commission 17th February 1947

Temporary Surgeon Lieutenant (D) R. J. [illegible] four years Extended Service Commission 26th February 1947

Temporary Surgeon Lieutenant (D) H. C. Martin four years Extended Service Commission 18th February 1947

Temporary Surgeon Lieutenant (D) M. S. Waldup four years Extended Service Commission 25th February 1947

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

RETIREMENTS

Matron Miss L. Phillips, *R.R.C.* (Retired), dispersed 31st December 1946

Acting Senior Sister Miss V. A. L. de L. Usher Somers placed on Retired List 18th March 1947

Notice.

BRITISH LEGION UNIT OF RHEUMATOLOGY

[illegible] Legion Unit [illegible] which was established at the Three Counties [illegible] Bedford [illegible] is to be transferred complete with [illegible] Royal Free Hospital.

[illegible] has been undertaken but all the known methods [illegible] that [illegible] has been successful is borne out [illegible] patients have left the Unit to return [illegible]

[illegible] because of its success it has been [illegible] upon all hospital regions where it is hoped [illegible] is encouraged, and that further research [illegible]

◆

Preparations.

[illegible] Industries [illegible]

Medical

[illegible] Tubarine brand [illegible] for use in surgery to produce complete muscular [illegible] anaesthesia [illegible] risks and [illegible] chloride [illegible] disorders [illegible] possessing the [illegible] properties of [illegible] readily absorbed [illegible] injection producing [illegible] side effects.

[illegible] a stable pentavalent antimony [illegible] Its exceptionally low toxicity facilitates [illegible] full doses of the drug without many of the risks [illegible] formerly in use.

[illegible] when applied to the face and exposed parts of the [illegible] for a period of several hours. This [illegible] in the light of wartime [illegible]

[illegible] water-resistant ointment containing [illegible] suitable for first aid dressings for minor cuts [illegible] normal healing of damaged [illegible]

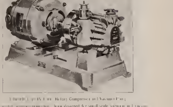
[illegible] insulin which has a moderately delayed and [illegible] soluble insulin and protamine zinc [illegible] but being considerably [illegible] extract having a high content [illegible] vitamins A and D together with [illegible] assimilable fat and carbohydrate and [illegible] tablet brand [illegible] analgesic and antipyretic combination useful in [illegible] relief of headache [illegible] dysmenorrhoea and other [illegible]

A [illegible] devoted to chemicals [illegible] including cinchophen, adrenaline [illegible] alkaloid, and pethidine hydrochloride. There was [illegible] veterinary products and an attractive series of photographs [illegible] the Company's products [illegible]

Equipment

Messrs. W. [illegible] & Co. (London) Ltd. display [illegible] equipment [illegible] the [illegible] Industries [illegible] the following [illegible] best [illegible]

The Type IV [illegible] pump and compressor can be [illegible] up to [illegible] and coding [illegible] together with [illegible] operation [illegible] under the [illegible] without skilled attention [illegible] glass blowing [illegible] printing, presses and [illegible] burners.



[illegible] Type IV [illegible] Rotary Compressor and Vacuum Pump

The [illegible] has been designed for small scale vacuum and pressure work. [illegible] vacuum pump is mounted [illegible] needed [illegible] drying trap and general vacuum and pressure [illegible] points. [illegible] the parts [illegible] they [illegible] taken to the work and [illegible] has been completed. [illegible] and absence of glass work are important [illegible]

JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE

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Balance Sheet

Assets	£	s.	d.	Liabilities	£	s.	d.
Balance in Bank 31st Dec. 1946	659	4	1	Staples Press Ltd. (October issue)	221	5	11
4% Funding Stock	100	0	0	Balance Creditor	1 170	19	[illegible]
4½% War Loan	600	0	0				
Subscriptions in arrears	33	1	0				
	£1 392	5	1		£1 392	5	1

Audited and found correct
P. H. MORRISSEY, Captain (S) R.N.

ERRATUM

Congenital [illegible] hernia in service [illegible] line 20 should read: [illegible] a *direct* inguinal hernia [illegible]

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Articles.

NUTRITIONAL NEUROPATHY AS SEEN IN EX-PRISONERS OF WAR FROM THE FAR EAST

WITH SPECIAL REFERENCE TO THE FACTORS RESPONSIBLE FOR THE DISTRIBUTION OF THE LESIONS IN THE CENTRAL NERVOUS SYSTEM[1]

BY

Surgeon Commander M. A. RUGG-GUNN, R.N.

Of all the lessons which have been learned and discoveries which have been made in the world of clinical medicine during the war of 1939-1945 one of the most important and interesting has been the development of our knowledge of nutrition and the elucidation of the various conditions produced by a low protein and relatively high carbohydrate diet coupled with a very low intake of the vitamin B complex. The Japanese prison camps produced much material in this respect and, furthermore, it is to be hoped that these pathological states will never again recur. It is necessary, therefore, to make as complete a study as possible of these conditions while the opportunity presents itself.

The main features of these deficiency states have been known for many years, but during these war years the world has witnessed starvation and malnutrition on a scale unprecedented in modern times, and a fairly accurate picture is beginning to emerge of the general effects of starvation and of the clinical patterns produced by the deficiency of a single substance or group of substances.

Following the fall of our garrisons in the Far East, British personnel endured a diet deficient in most of the essential foodstuffs and developed various nutritional neuropathies which form the subject of this paper.

Prison Camp Life and Conditions

Perhaps a general outline of conditions in the camps, with special reference to the work done and the food consumed, is justifiable at this stage.

After capture there was often a long period of complete or partial starva-

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[1] Somewhat abridged form of thesis accepted for M.D. by Cambridge University in February, 1947.

[illegible] in many [illegible] accompanied by forced marches before the prisoners finally reached their ultimate prison camps. For the most part officers and men were segregated but although in all camps the basic diet was deficient the degree to which this could be supplemented varied considerably. Living conditions and sanitation were [illegible]; insect life of all sorts was prolific and universal; discipline was [illegible] and minor breaches were apt to be followed by severe or inhuman punishment [illegible] without some sort of excuse was comparatively [illegible] camps.

The individual camps varied [illegible] and the rations varied according to the seasons, the year and the [illegible] in charge of them, but one fairly universal practice was that of putting a man on half rations if for any reason he was unable to work. Illness was almost universal; diarrhoea, whether due to the various types of dysentery, coarse or unsuitable food or frank starvation, troubled everyone; bouts of fever (malaria, dengue and sandfly fever) occurred off and on; jaundice was frequent in some camps and phthisis was rampant in certain areas. Several camps had outbreaks of diphtheria more especially in the Hong Kong area, and jungle sores and various skin conditions added to the general picture. The degree of work, although generally of a hard manual nature, varied from the forced labour of the notorious Burma-Siam railway, which is said to have cost a life for every sleeper laid, to the comparative inactivity of menial duties about the camp.

On the whole adequate time was allowed for sleep, although this was often rendered impossible by various ailments, climatic conditions and insect pests.

It is against this background of stress, physical and mental, trying climatic conditions, constant intercurrent disease and varying stages of under-nourishment that the whole question of nutritional neuropathies as seen in ex-Japanese prisoners of war must be judged.

DIET

The official Japanese scale of rations was laid down as follows (Simpson, 1946):—

Polished rice	800 gm.
Vegetables	400 gm.
Meat	50 gm.
Bread	[illegible]
Coconut oil	10 gms.
Salt	5 gms.

This amounts to about [illegible]

This basic diet is in itself deficient in many essential foodstuffs, more especially the vitamin B group and the minerals. It is difficult to assess the approximate vitamin content of such a diet without more definite knowledge as regards the nature of the vegetables and the kind of flour used, but generally speaking it would work out at about 130 I.U. of thiamin and 130 S.B.U. of the vitamin B_2 group, thus being very far short of the minimum required by the League of Nations standard ([illegible] I.U. vitamin B_1 and 400 units S.B.U. vitamin B_2). Such a diet is also markedly deficient in protein, the maximum quantity in such a diet (presuming that the meat was lean and the bread of high protein value) being under 50 grm. per day.

Such was the theoretical basic diet, but in actual fact this diet was never achieved nor even approached in any of the prison camps. The mainstay of the diet was rice, mainly polished and usually boiled, though sometimes this was fried in oil to make a rissole. For the most part during 1942 the quantity of rice fell, and further reductions took place during the following years; it is probable that about 350 grm. a day would be a fair average estimate for 1942, falling to about 200 grm. before liberation.

In Formosa, China and Japan polished rice appears to have predominated, while in Malaya, Java and Indonesia the reverse was true, but in all areas this was a variable factor. The rice was mostly of very poor quality and deteriorating from storage, and was frequently invaded by weevils and other insects.

The quality and quantity of the vegetables were likewise extremely variable. In some camps fresh fruit was available from time to time, but in the majority many months passed without any form of fruit appearing, and the prisoners were dependent upon a mixture of boiled vegetables for their supply of ascorbic acid. Chinese cabbage, dandelion leaves, chrysanthemum leaves, sweet-potato tops (rarely sweet potatoes), Chinese radish, brinjals, yams and occasionally onions seem to have been the most common, but in practice it has been extremely difficult to identify many of the vegetables which the patients questioned on the subject were apt to term somewhat loosely "grass," "river weed," &c.

Meat was almost invariably scarce and of very poor quality, being mostly bone and gristle, and its chief value appears to have been the flavour it imparted to the stews. Almost all was stewed and served at the midday meal; a small fragment might or might not be discovered by an individual prisoner in his bowl. The Japanese appear to have made a habit of handing over to the prisoners for consumption any animal which died of an unknown cause; as far as can be gathered comparatively little harm appears to have followed the eating of such meat, doubtless due to the prolonged boiling it underwent, and it did mean that every now and then for a brief period a reasonably liberal supply of meat was available.

Fish occasionally appeared on the menu of camps near the coast; much of this was frankly uneatable and occasionally it was partly salted or in other ways cured, but the allowance per prisoner was for the most part minute. In some camps, notably in Korea, the diet was supplemented by prawns and other shell fish.

Bread was virtually non-existent; when it was supplied its quality was doubtful and it was given out in only very small quantities, and it played no material part in the diet of the vast majority of prisoners.

A small quantity (usually about 20 grm. per head) of vegetable oil was issued most days; the nature varied—it was occasionally palm oil but more often arachis or coconut oil—and it was frequently used for frying purposes.

What is probably a reasonably accurate account of the weight and caloric value of daily rations at one camp is given by Clarke and Sneddon (1946), and this form [illegible] very well the steady [illegible] throughout the years of captivity. The daily intake [illegible] [illegible] grm in 1942 to 33 grm in 1944, fat from 30 grm to 24 grm. [illegible] carbohydrate intake and calorie value probably did not alter very much. The intake of vitamins A and D were for the most part adequate, the abundance of carotene and sunshine accounting for this, and the supply of vitamin C was likewise sufficient, but there was a marked deficiency in all components of the vitamin B group and of the mineral salts.

Two factors, however, make the above facts much more drastic than they seem on paper: one was the diarrhoea which periodically affected everyone and interfered with both the absorption of food and the synthesis of vitamin B in the gut, and the other that prisoners who reported sick were almost invariably put on half rations.

From time to time in many camps the diet was supplemented, sometimes by local purchase, sometimes by Chinese Red Cross parcels, but more often by the foraging done by labour gangs. Considerable ingenuity was often displayed at camps to obtain an adequate vitamin consumption, and at Changi prison at Singapore an improvised drying plant was put into service, allowing the rice polishings to be stored in a stable form, and a variety of methods of extracting salt from the sea was devised. Yeast was grown at some camps, but on the whole met with little success. The food situation can in general be summed up by saying that the diet was invariably of low calorie value and markedly deficient in protein and the vitamin B group, and moderately deficient in fats and minerals.

The Symptomatology of the Syndrome

During the first few months of imprisonment the prisoners suffered from loss of weight, progressive asthenia, ever-increasing hunger, mental lethargy and later polyuria. After about four months the first signs of deficiency disease began to make their appearance: scrotal lesions and sore tongue usually came first, to be followed quickly by other signs of ariboflavinosis, cheilosis and angular stomatitis. A month or two later swelling and soreness of the feet appeared and soon developed into a symptom variously known as "burning feet," "electric feet" or "happy feet," and about the same time signs of failing vision and later of difficulty in hearing and walking occurred; lastly, a few cases developed spasticity.

Broadly speaking, cases of nutritional neuropathy fall into four groups which may or may not be associated and occur together, and will be considered under these headings:

I. Peripheral neuritis, including "electric feet," and involvement of the cranial nerves.

II. Nutritional amblyopia.

III. Involvement of the spinal cord.

IV. Mental changes associated with the above.

1. Peripheral Neuritis, Including "Electric Feet" and Involvement of the Cranial Nerves

Painful feet was by far the commonest manifestation of involvement of the nervous system. It had at one time and another been present in all but 5 of the 43 cases of nutritional neuropathy which were personally examined by the author. Its actual incidence is hard to assess and varied greatly from camp to camp but the figures 2,000 out of 7,000 were given as a conservative estimate for both the Manila and Hong Kong areas (Page, 1946). The first symptoms of the condition appeared three to seven months after internment, depending on the camp and diet, weather and amount of work done, and were briefly as follows. The first abnormality noted was a vague ache in the feet, especially at night, and fairly easily relieved by movement; this at any rate among naval personnel in the Hong Kong area received the name of "fidgety feet". Soon afterwards tinglings and "pins and needles" made their appearance and the ache became much worse and more persistent, assuming a burning character and affecting mostly the soles of the feet, especially the metatarsal heads, but occasionally spreading on to the dorsum of the foot and into the toes. Several patients described this stage as feeling as if cold water were running over the feet. Tenderness of the feet then appeared and the sufferer could not tolerate his shoes on or the weight of his blankets at night.

These pains were generally, though not invariably, more severe at night in the first stages at any rate; they were relieved by movement and were always strictly bilateral in distribution, and in only the very worst cases were the hands affected and then never to the same degree.

The appearance at this stage was apparently variable; there might be redness with slight swelling and sweating of the feet (Page, 1946) or they might appear bluish or pale (Cruickshank, 1946), but in the majority of cases no great deviation from the normal appears to have been noted, and the arterial and capillary circulation was little affected.

A minority showed extreme hypersensitivity to pin prick and light touch and were extremely nervous when the likelihood of their feet being examined arose. At this stage also the tendon reflexes began to show some degree of exaggeration which tended to progress as the disease wore on.

The next stage may be described as the stage of shooting pains—sharp stabbing pains sometimes described as like being burned or like red hot needles, and sometimes like a knife or a nail being driven into the flesh. These pains were of considerable severity and generally radiated up the legs from the foot towards the knee, and were worse at night and in wet weather. Some relief could be obtained by putting the feet in cold water, but most relief was obtained from exercise, with the result that the sufferers spent the nights jumping about, getting a companion to rub their legs, or putting their feet in cold water. Usually these pains were confined to the feet but a small minority had similar pains in the hands.

The stage of vascular dilatation came next; the feet were hot and sweating and this was accompanied by loss of sensation, first epicritic and then protopathia (Jackson 1946) over the stocking area and associated with muscular wasting and weakness and defective gait, so that the patient now walked on a wide base with inversion of the feet, internal rotation of the legs and slight flexion of the knees, wincing with pain as each foot touched the ground (Page 1946).

Finally, numbness with loss of sense of touch and temperature supervened and a few cases advanced to gangrene of the feet, more especially if they had been exposed to cold.

Such is the broad outline of the painful feet syndrome, which has also been called "happy feet" (apparently from the desire to dance about in order to get relief), "jittery legs", "dancing feet" and "electric feet". This last was perhaps the one in most common use among naval personnel. The condition will be recognized as essentially a polyneuritis but one possessing certain peculiar features—mainly the predilection for the legs and sparing the hands, the increase in tendon reflexes, the apparent absence of muscle tenderness and perhaps the prominence of subjective symptoms over objective sensory loss, at any rate in the earlier stages. Pain was all along the outstanding feature, but in polyneuritis generally this is a very variable feature, being perhaps most marked in alcoholic and arsenical neuritis and often absent in cases of diphtheria.

Whilst listening to the numerous and varied descriptions of these pains one was constantly reminded of the pains of causalgia, erythromelalgia and immersion foot; all have the same intense persistent burning pain and desire to keep the affected parts cool, but quite the closest resemblance would appear to be immersion foot as described by Ungley *et al.* (1945). The hyperaemic stage of immersion foot shows the same burning pains and even the same shooting and stabbing pains which are relieved by cold though not apparently by exercise. The stabbing pain bears a superficial resemblance to tabes but differ from the classical tabetic stabs in that they are longitudinal and radiate up from the foot to the knee.

The exact mechanism whereby this syndrome is brought about is at present unknown; a variety of suggestions have been put forward—deficiency in protein or amino acids or of one or more of the components of the vitamin B complex, either alone or in combination, and possibly combined with a superadded toxic factor. The material for controlled experiments on these cases was for the most part lacking, but certain factors do stand out:—

(1) Vitamin B_1 (thiamine or aneurin) does not appear to have any appreciable curative effect (Simpson 1946; Cruickshank 1946).

(2) It is improbable that the p.p. factor is in any way responsible; certainly classical pellagra can occur apart from this syndrome.

(3) Nicotinic acid and nicamide are capable of producing some improvement. Cruickshank (1946) claims that intravenous nicamide produced a rapid and satisfactory response though no improvement followed its administration by mouth, but others (Simpson 1946; Harrison 1946) claim that no marked improvement followed treatment with nicotinic acid. Nicamide has no immediate vasodilator effect as has nicotinic acid, though otherwise

its action is similar and the difference in results may lie in the failure of absorption in those cases who were treated by mouth, but even using intravenous nicamide Cruickshank failed to obtain improvement in some 20 per cent of cases Graves (1946) however claims a considerable degree of success with nicotinic acid using the intravenous route 37 per cent being cured 30 per cent much improved and 30 per cent improved

(4) Calcium (Page 1946 Harrison 1946) phosphorus (Page 1946) and vitamin A (Simpson 1946) deficiency apparently played no definite part

(5) Certain food substances rich in more than one complex of the vitamin B group produced a variable amount of improvement notably barley (Jackson 1946) rice polishings (Cruickshank 1946) Marmite (Simpson, 1946, Cruickshank 1946), yeast (Simpson 1946) and a vegetable known as green gram or kachang hijau (phaseolus radiatus)

(6) Gopalan (1946) describes a similar condition in the natives of Southern India their diet contains sufficient aneurin to prevent beri beri but is poor in riboflavin though riboflavin itself does not cure the condition which is said to respond to yeast and to be curable by pantothenic acid Other syndromes however notably the early greying of hair have been attributed to pantothenic acid deficiency and are not accompanied by painful feet

(7) Lumbar sympathectomy gives no relief Page (1946) states that this was carried out by Japanese surgeons in five advanced cases with no benefit whatever and fatal results in two, and Jackson (1946) quotes its performance in eight cases with disastrous results in six

Such are the main known facts many theories such as the presence of a toxic factor or associated mineral deficiencies have been put forward as possible explanations It seems on the evidence before one that more than one factor may be responsible and at all events the ramifications of the vitamin B group have not yet been fully worked out Vitamin B_6 (adermin or pyridoxin) may play a part rats fed on a diet deficient in this substance develop a symmetrical dermatitis affecting the paws and later the ears and nose which become red, swollen and oedematous

It would probably be fair to state that the condition is in essence a peripheral neuritis but differing from the classical forms of the disease in certain respects brought on by a high carbohydrate diet in the presence of multiple vitamin B deficiency though possibly influenced by alcohol more than by any other component

Following release from the Japanese prison camps the patients were well cared for and fed on a high protein and high calorie diet extensively supplemented by various forms of vitamin therapy By the time they reached the British Isles usually some two to three months later their bodies were well saturated with all the known vitamins most of them regained their former weight and in some cases exceeded it The recorded cases were seen three to nine months after liberation and by this time it would seem that in the majority the maximum degree of improvement had already been attained It will be seen that most suffered from one or more forms of nutritional neuropathy but

In the [illegible] remarks will be confined to the end results of the [illegible] [illegible] six months after liberation.

Subjective sensations were always well in excess of objective sensory changes. Frank pain was virtually absent, at any rate when at rest, and patients usually complained that their feet (and occasionally their fingers) felt dead or numb, or constantly wet, and the severe pains which had formerly dominated their lives were past. Reasonably typical glove and stocking anæsthesia could often be demonstrated (Case VI), though this was always more marked in the lower limbs than in the hands, but changes in the hands were sometimes demonstrable (Cases II and V). Slight muscle tenderness was very occasionally seen (Case IV), but a striking feature was the persistence of hyperæsthesia which at times was for years (Cases I, II, III and V). Case I was quite exceptional: six months after release the hyperæsthesia was sufficiently marked to prevent walking or standing, and in this case alone it was associated with marked and constant sweating of the feet, though vascular changes were absent.

Involvement of the cranial nerves, exclusive of the optic tract.—Varying degrees of cranial nerve involvement were met with in cases who had complained of painful feet. Smell was found to be defective in only one patient (Case VII). It does not appear to have been described in the literature on this subject, possibly because it has not always been sought for or inquired into, though several patients when questioned closely stated that they thought their smell was at times somewhat deficient whilst a prisoner, though they had paid little attention to it. It must be mentioned, however, that strong odours prevailed in most of the camps and that loss of smell needed to be fairly gross before it was appreciated. In Case VII complete loss of smell came on while the patient was suffering from widespread cranial-nerve involvement, and though it was late in appearing it persisted and showed no signs of recovery. No local cause was found to account for it and there was never any parosmia or reason to believe that it was central rather than peripheral in origin. He had sustained no head or facial injury. In this respect it should be mentioned that prisoners were not infrequently struck over the face by their Japanese guards.

Transient diplopia, presumably due to a weakness of one or more of the nerves supplying the extrinsic muscles of the eye, occurred in a few prisoners, but appears to have cleared rapidly in every case.

Numbness of the face and teeth has been described (Hobbs and Forbes, 1946), but was definite in only one case in the present series (Case I). No case of paralysis of the facial nerve appears to have been described.

Nerve deafness was fairly common: it occurred in some 16 per cent. of the present series of cases and, after the optic nerve, was probably the commonest of the cranial nerve lesions. It is also recorded by Spillane and Scott (1945) as having occurred among German prisoners of war. Sometimes its onset was apparently sudden, with rapid deterioration leading to almost complete loss of hearing (Case VIII), but generally it was more gradual, and several patients stated that it was first noticed as difficulty in distinguishing [illegible] of their friends. In this respect it is of interest to [illegible] that among [illegible] war, the first signs were often difficult [illegible] finding [illegible] high-frequency tonal differentiation, that this was not [illegible] complained of in the Japanese camps is probably due to the fact that no wireless sets were allowed. As a rule a fair degree of recovery took place, and when examined some months after release the common findings were marked reduction in bone conduction, especially for the lower tones. The tympanic membranes presented a normal appearance.

It is probable that the incidence of nerve deafness was actually fairly high during captivity. Burgess (1946) recalls that most sufferers did not notice it until it was pointed out to them, and many had probably to all intents and purposes recovered by the time they were examined in the United Kingdom. Tinnitus was complained of by a few cases but was seldom really troublesome (*see* Case VIII).

Difficulties in swallowing and speaking were fairly frequently complained of during captivity, but all had recovered within a few months of release. It is just possible that some cases of hoarseness may have been due to pressure on the left recurrent laryngeal nerve by a dilated left auricle, though in view of the association with other symptoms suggestive of bulbar palsy it is far more probable that the symptom was due to peripheral neuritis. Furthermore, Albert (1931) discussing abductor paralysis of the vocal cords in cases of infantile beri beri states that at autopsy there was a "degenerative neuritis of the recurrent branches of the vagus nerve." Case VIII was a fairly severe example of bulbar palsy, showing difficulty in swallowing and marked hoarseness which at its height amounted to an almost complete aphasia, in addition to deafness.

No definite evidence of involvement of the eleventh and twelfth cranial nerves is available and, in fact, all along the sensory nerves appear to have been much more readily affected than were their motor counterparts.

II. Involvement of the Eyes

As a rule, visual defects made their appearance somewhat later than did the burning feet. The onset was in most cases more or less gradual, for a while before actual deficiency in sight was noted there was often a prodromal period when the patient complained of conjunctival irritation and lachrymation, pain in the eyeballs, photophobia and supra-orbital headaches. Although these prodromal symptoms were as a rule mild and probably overshadowed by various other complaints the patient had at that time, they could be elicited from most patients on close questioning and in some cases were a distressing incapacitating feature (*see* Case X). Shortly afterwards actual visual defects appeared; patients frequently noticed they were unable to read or that when reading a long word there were gaps in the middle, or they found they were unable to recognize the faces of their friends afar off and objects became indistinct in outline and blurred—like "looking through water," as one patient (Case XIII) described it. Occasionally the onset was remarkably sudden, the patient being reduced to little more than light perception in the course of a few days (*see* Case XII). Some camps actually issued blind badges so that the sufferers could be distinguished from their fellows.

Many of these early symptoms may be due to causes other than involvement of the optic nerve: conjunctivitis, blepharitis and corneal ulceration were rife in most camps, and Hazleton (1946) has drawn attention to the rapid exhaustion and early fatigability of the ciliary musculature which responded very readily to thiamine. The same author also states that the conjunctivitis improved to some extent as a result of thiamine administration.

The blurring of vision was most noticeable in bright sunlight and, in fact, vision in moonlight appears to have been unimpaired (Hazelton, 1946). Colour vision tended to become impaired *pari passu* with the decline in vision.

Inspection of the eye at this stage often revealed very little: the pupillary reactions were normal, the discs were often normal and, though in other cases they appeared red and blurred, there does not appear to have been any parallelism between fundal changes and functional loss (Simpson, 1946).

Perimetry at this stage showed a central scotoma, more or less circular in outline and usually absolute, but surrounded by a larger relative area. The initial defect was for red, later for white and returning to red in those cases which improved (Durran, 1946). Macular changes were not uncommon, but hæmorrhages and exudates were not seen. Eggs (Hazelton, 1946) and yeast and Marmite (Simpson, 1946) are all credited with bringing about a fairly rapid improvement in the early stages. The tendency was for vision to decline quickly or slowly to a certain level and there to remain more or less stationary or possibly slowly improve. In certain cases (for example, Cases X and XIII) the vision improved markedly for no very apparent reason. The patients themselves often gave a history of spontaneous improvement in response to thiamine and nicotinic acid (Cases II, XIX and XXI), though how much was due to the improvement in health of the conjunctiva, cornea and ciliary musculature, and how much was due to a subsidiary neuritis is impossible to say.

Pallor of the temporal halves of the optic disc next made its appearance and when once established it remained permanently. Limbal vascularization characteristic of riboflavin deficiency was not seen (Dansey Browning and Rich, 1946; Williamson, 1946). According to Williamson ocular symptoms tended to occur first among the heavy smokers. Such was the state of affairs during imprisonment: after release the majority of cases and especially the milder ones improved though to a variable extent, the vision of many returning to normal limits.

The cases recorded in this paper were seen three to nine months after release, by which time the condition of their eyes had probably become static. Visual acuity (after refraction) varied within wide limits. Some degree of vision remained in every case and as a rule the remaining sight was approximately equal in the two eyes. Most, but not all (*see* Cases XIII and XIV), of the cases showing gross deterioration of vision had other signs of central nervous system involvement.

Case XXIV was nearly blind, but this was considered to be mainly d not entirely due to myopia. Case X. was exceptionally severely affected, his vision being R. 1/60, L. 2/60. Case XIV. showed 3/60, both eyes. Case XIII. showed 4/60, both eyes. Case VIII. right 4/60 and left 1/60. Case III. 6/60 both eyes. These were the most severe cases seen, the remainder showing a variable degree of visual defect, though many cases reached normality.

Pallor of the temporal halves of the optic discs was a fairly constant and striking physical sign. Some degree of temporal pallor is not uncommon in normal people, and at first it was diagnosed with considerable reserve, but as time went on it became clear that it was one of the most common and constant of physical signs of central nervous system involvement, and was not infrequently seen in patients who made no specific complaint about their eyes. The area of pallor was situated between the superior and inferior temporal vessels, and in some cases was associated with pigmentary disturbances in the region of the macula (*see* Case XXII). In one case (Case X.) the optic atrophy had become more widespread and involved the entire disc, but even here it was more striking in the temporal side.

The visual fields.—The peripheral fields were full or, at the most, very slightly diminished (Cases XVI and XVII). Examination of the central fields showed typically the presence of a scotoma, either central or paracentral, and for the most part affecting the centro-caecal area between the fixation point and the blind spot. For their detection a Bjerrum screen at one metre or preferably at two metres is essential. The scotomata were more or less circular in shape; in the very mild cases there was only a small bilateral relative scotoma for red (Case I); in the slightly more severe cases a relative scotoma for white would appear (Cases IV, V and XV), and in some (for example, Case XIX) there was an absolute core surrounded by a larger relative scotoma. The blind spot was sometimes enlarged (Case XXV).

There seems little doubt that considerable improvement could occur, at any rate in the earlier and less severe cases. Case XVII, for example, was at one time reduced to little more than light perception, and yet examination later revealed no detectable change. Case XVIII also returned to normal, though his vision was never so profoundly affected; Case XII was known to have had a bilateral scotoma for red which later cleared, and Case II improved from R. 6/60, L. 6/18 on release to R. 3/36, L. 6/6 some months later.

On the whole, the presence of a central field defect seems to be the most accurate method of assessing visual involvement. Case I had virtually normal vision and normal discs, but a small central scotoma for red, and Case XV had very slightly impaired vision and normal fundi with a bilateral relative scotoma. In the worst cases there was usually a considerable degree of impairment for colour appreciation.

The scotomata were almost invariably bilateral (only Case XVI showed a unilateral defect), though they were not always equal in the two eyes.

The causative factor or factors are at present somewhat speculative, but the main known facts can be summarized briefly as follows:—

(1) There seems to be general agreement that thiamine plays no part

and has a curative effect (Hobbs and Forbes 1946; Dansey Browning and Rich 1946; Moore 1946).

(2) The part played by nicotinic acid is extremely doubtful and the relationship to riboflavine deficiency is indefinite, though this last question has not been explored fully. It is certain, however, that many showed no pellagra and pellagrins do not invariably develop optic symptoms.

(3) Rice polishings give rise to no definite improvement (Williamson 1946).

(4) The condition apparently responds to green gram (Dansey Browning and Rich 1946) to a combination of green gram and barley, and also to autoclaved yeast and Marmite (Simpson 1946; Moore 1946).

(5) Eggs have a very marked beneficial effect (Hobbs and Forbes 1946; Hazelton 1946; Durran 1946)—probably more so than any other single entity—and this fact became widely known among the prisoners themselves, who frequently remarked that an egg did their eyes more good than did any injections or medicines.

(6) Animal protein is a good prophylactic: meat, liver and fish are all credited with some curative effect, and no cases were found in camps where an adequate supply of tinned meat was available (Hobbs and Forbes 1946).

It seems fair to state that no single known vitamin or even combination of vitamins alone is responsible: the condition is linked up with prolonged protein deficiency combined with a high relative carbohydrate intake and multiple vitamin deficiencies of the B group.

Scotomatous vision associated with peripheral neuritis has long been recognized as a syndrome occurring in deficiency diseases, and in its main features it resembles amblyopia resulting from certain poisons.

The toxic amblyopias fall into two main groups: the first group contains poisons which produce also a peripheral neuritis, and includes lead, carbon bisulphide, alcohol, arsenic and diabetes, and is characterized by a central or centro-caecal scotoma (suggesting that there is a selective affinity for the papillo-macular bundle) without appreciable involvement of the peripheral fields; the second group is that in which quinine and filix mas amblyopia belong, which show mainly a peripheral loss. The nutritional amblyopias fall within the first group. There are certain minor differences which serve to distinguish the amblyopias of nutritional origin from those produced by tobacco, though on the whole the similarity is very close, but in the latter the initial defect is usually in the neighbourhood of the blind spot and tends to become merged with the fixation point, later producing an oval horizontal defect.

The picture is apparently identical with the field defects which have been reported in pernicious anaemia associated with subacute combined degeneration of the cord, though ophthalmic signs may precede the anaemia by some years. Traquair (1942), who shows two charts demonstrating the central defect, has pointed out the similarity to Leber's disease in that the scotoma is pericentral and may be associated with centro-caecal scotomata, and the defects are multiform but do not possess definite quadrantic or hemianopic features.

It seems fairly certain that tobacco played no great part in the production of amblyopias in prisoners of war. Williamson (1946) states that in Changi [illegible] did first appear among the [illegible] the vast majority of prisoners in most camps had little or no [illegible] and those who did were mostly officers in whom the [illegible]. In one or two officers' camps, mostly in Java, the allocation of tobacco was remarkably generous and at times included a daily issue of cigars, although amblyopia appears to have been very rare in these camps.

III. Involvement of the Spinal Cord

It is difficult to be sure from the histories at what stage symptoms of spinal cord involvement first appeared, as the picture is complicated by burning feet and general weakness, but on the whole it seems to have become obvious some months after the onset of burning feet and eye symptoms. First of all the patient would notice a slight unsteadiness combined with weakness, most noticeable when walking or standing in a queue. A little later a tendency to stumble would become apparent, and not infrequently a patient's ataxic gait would in the first place be pointed out to him by his fellow prisoners. Occasionally it was first noticed at night or when trying to climb; one patient first experienced it when he was trying to climb into the back of a lorry and found he could not place his legs to find the step.

Examination at this stage showed a little swaying at the Romberg test, the patient walking on a wide base, and slight loss of vibration sense and passive posture of the feet (Spillane and Scott, 1945).

As the condition progressed symptoms became more and more marked, the men walking cautiously, holding their legs stiffly and showing a foot consciousness reminiscent of a man with bad corns (Simpson, 1946). The more severe cases progressed to a profound ataxic paraplegia.

In the present series all except the two spastic cases (Cases XXV and XXVI) had a previous history of burning feet.

In the early stages at any rate increase in the tendon reflexes appears to have been the rule.

Remarks on cases examined in this country some months after release will be confined first to the common syndrome characterized by deficient vibration- and posture sense; spastic cases will be considered later. All these cases either had signs of optic nerve involvement or gave a history suggestive of such during captivity. Symptoms were invariably bilateral and almost entirely confined to the lower limbs.

The musculature was either little changed or showed slight wasting and loss of tone, combined with a variable amount of weakness, usually most marked in the thigh muscles and the dorsiflexors of the foot. The relationship of muscular atony and weakness to signs of posterior column involvement was somewhat indefinite. Case I, for example, had extensive loss of vibration sense but little actual muscular weakness.

The tendon jerks were, on the whole, little altered and bore no close relationship to the degree of peripheral neuritis present. In some cases they were somewhat exaggerated (Cases IV and VIII); in other cases they could not be obtained (Cases II, X and XXI), while in others the ankle jerks were lost while the knee jerks though poorly marked were obtainable (Cases VII and IX). The upper limb reflexes were always obtainable, and the abdominal reflexes were easily elicited in all but one or two of the older men in whom their absence was probably of no significance. Vibration sense as tested by tuning fork C beating 128 times a second, appears to have been lost early, and in the cases seen in the United Kingdom after release loss of vibration sense was more constant and much more widespread than that of any other type of sensation. In the milder cases it was absent only from the feet and ankles (Cases III, XV and XXIV); in the more severe cases it was from the knees downwards (Cases VII, VIII, XX and XXII), while in the worst cases there was no response in the lower limbs, anterior superior iliac spines or over the sacrum (Cases XVIII and XXI).

Loss of joint sense on passive movement was never so widespread, and all cases could appreciate some movement and retain some sense of position at the knee and even at the ankles, though this was often grossly impaired (Cases I, IV, VII, IX, X, XXI and XXII); it was, however, often absent at the toes and in the mid tarsal joints (Cases VIII, IX, XXI, XIX and XX). Loss of joint sense ran parallel to though lagged behind vibration sense, and no case showed any impairment to either in the upper limbs or above the waist.

Co-ordination, as judged by the execution of fine movements with the lower limbs and by the heel to shin test, showed marked impairment approximately parallel with the degree of vibration and joint sense loss. Co-ordination in the hands and arms was always within normal limits.

Rombergism proved a fairly delicate test, slight swaying being present in some cases where objective signs of posterior column involvement were lacking, and it was present to a gross degree in those cases showing marked posture and vibration sense involvement.

The gait was essentially ataxic, the patient walking on a broad base, lifting his legs somewhat unsteadily and tending to raise them unduly high, at the same time watching the ground carefully and tending to sway from side to side. The worst cases were unable to walk without mechanical help.

Occasionally there was some improvement with exercise designed to re-educate the patient in the use of his lower limbs, even though subsequent clinical examination showed the degree of sensory loss to be unaltered. Case IV, who had signs of widespread loss of deep sensation, improved considerably after a month's intensive tuition, but with the majority of patients it was disappointing.

Cases showing signs of pyramidal tract involvement.—These form a very much smaller group and are in many ways quite distinct from the other forms of nutritional neuropathy.

It is difficult to obtain exact information as to their frequency; it is probable that a high proportion of them died as the condition appeared early in imprisonment and they were severely incapacitated. In consequence the actual incidence may be somewhat higher than would appear from examination of cases after release. Burgess (1946) states that about 40 cases occurred in a group of 50 000 all in the first eighteen months of captivity and at a time when the incidence of other forms of neuropathy was at its highest Hobbs and Forbes (1946) on the other hand quote 4 cases out of a total of 37 The incidence appears to have been very patchy and Price (1946) points out that in Singapore all the cases came from two camps

Generally speaking spastic paraplegia first became evident about six months after imprisonment and for some curious reason no fresh cases appeared after this time

According to Spillane (1946) the onset was in many cases acute and accompanied by confusion amnesia diplopia loss of vision and rigidity those who recovered being left with lower limb rigidity absent abdominal reflexes and bilateral extensor plantar responses but without sensory loss

Two cases are recorded in this paper both came from Hong Kong though from different camps and one developed four months and the other six months after capture Both cases showed evidence of optic neuritis although, somewhat curiously neither gave a history of burning feet in spite of the fact that Case XXV had experienced signs of cranial-nerve involvement (deafness and impaired phonation) during imprisonment which later cleared Although both cases showed some evidence of bilateral pyramidal involvement it was very much more apparent on the right side in Case XXVI and on the left side in Case XXV Neither case showed any evidence of damage to the posterior column

It is just possible that in both these cases the spasticity was due to causes other than nutritional neuropathy, in Case XXVI who was 35 years of age senile vascular changes may have played their part and in Case XXV the question of disseminated sclerosis was seriously considered, but on the whole it seems most probable that in both cases the underlying cause was the same and dependent on their life and feeding in the prison camps In Case XXV an unusual feature was the profound loss of superficial sensation in the left leg for a while it appears to have been absolute but later cleared

It is tempting to draw a parallel with lathyrism and presume a toxic factor in these cases They resemble lathyrism in that the spasticity is confined to the lower limbs but to some extent differ from it in the absence of numbness muscular pains incontinence and impotence As far as can be gathered from their histories there is nothing to suggest that vetches or other unusual articles of diet were consumed by these patients but it is impossible to be certain on this point and the somewhat patchy distribution of the cases lends some support to this theory

II *Mental Changes*

Before leaving the effects of malnutrition upon the central nervous system it is justifiable to query what ill effects if any the higher centres in the frontal and prefrontal lobes sustained Much of this must remain conjecture for it is difficult to dissociate the psychological from the organic as four years imprisonment under such extremely adverse conditions is bound to leave its mark and furthermore increased irritability, lack of powers of concentration and [illegible] are extremely common in the tropics. It is well known that considerable damage to these areas may take place without appreciably altering either the personality or the mental powers; furthermore the process is a slow one and the nervous system is extremely labile and readily adjusts itself to new conditions, a fact which is well shown in prefrontal leucotomy where the return of the personality to normal can be traced as each month passes. When allowance is made for all these factors the impression remains that minor degrees of mental impairment among ex-Japanese prisoners of war are very common and far more common than among those imprisoned in the European theatre of war. It is perhaps best judged in officers in whom frank neuropathy is absent and whose former intellectual standard can be more accurately assessed. On direct questioning few patients owned to more than increased irritability and occasionally forgetfulness, but in a few cases where the relatives were questioned it became apparent that forgetfulness and slowness of thought were more profound and more widespread than was at first appreciated.

Very few cases of psychoses appeared after release, as Kirkman (1946) remarks, they were not more frequent than might have been expected among the general population, but during captivity mental changes—though not necessarily organic—appear to have been reasonably common. Page (1946) mentions loss of memory, Garland (1946) speaks of ataxic paraplegia being associated with mental degeneration, and Burgess (1946) mentions an outbreak of Wernicke's encephalopathy which responded to thiamine. Spillane (1946), when discussing a comparable condition in Axis prisoners in the Middle East, also mentions the occurrence of Wernicke's encephalopathy and, in addition, speaks of "atypical encephalopathic states" characterized by stupor, confusion, delirium and mania among some prisoners.

It is reasonable to assume, therefore, that some impairment of the higher faculties dependent upon structural changes did take place in many of these cases.

General Remarks

An account of the main features of this syndrome has been given, and before considering the anatomical questions involved a few general remarks on the subject are called for. Altogether 73 cases of ex-Japanese prisoners of war were examined some three to nine months after release, and of these 9 were found to have no evidence of neuropathy although most of them had experienced burning feet during captivity. Two of these cases (Cases XXIII and XXVII) are recorded here for special purposes. Four further cases had doubtful or equivocal signs of disease (eye symptoms probably not nutritional in origin, doubtful mental degeneration and exaggerated deep reflexes not clearly pathological) and need not be considered further. The 40 remaining cases all showed signs of central nervous system involvement or gave a history which left little doubt that it had been present at some stage during captivity. Of these 40 cases, 36 (90 per cent.) either had some optic neuritis or gave a history suggestive of such; 16 (40 per cent.) showed some ataxy; 15 (38 per cent.)

showed some degree of peripheral neuritis and [illegible] per cent had deafness and 2 (5 per cent) showed signs of pyramidal tract dysfunction. No cases showing signs of cerebellar dysfunction or sphincter troubles were seen.

The case histories were recorded from the patients themselves and were unsupported by documentary evidence; they are therefore far from infallible, especially as regards the nature of the drugs used, and they have been much abbreviated, especially as regards the very numerous intercurrent illnesses which most of them experienced. The case histories have also been varied to give a general picture of camp life: in some details of food are given and in others the type of work carried out.

Auxiliary investigations have, on the whole, been of very little use. A fractional test meal was done in five, but was always within normal limits and no case of achlorhydria was seen, though Durran (1946) hints that a hypochlorhydria was a fairly common finding during captivity. Complete blood counts were done in 15 cases, but these again showed no pathological features, though Gupta (1946) mentions both microcytic and megalocytic anaemia being present immediately after release. The cerebrospinal fluid was examined in five cases, but was normal in all respects, and Clarke and Sneddon (1946) report that this was always normal in their cases examined soon after release.

Two classes of prisoner appear to have been relatively exempt from nutritional neuropathy—officers and cooks. The reason is obvious: both had access to additional food, which apparently sufficed to ward off the condition, at any rate in its grosser forms.

One unusual and surprising finding of the analysis of these cases was the inverse relationship of oedema to neuropathy of the central nervous system, more especially lesions of the spinal cord. It will be noticed that Cases II, VI, XIII, XIV and XXIV suffered from fairly marked oedema during captivity, but escaped injury to the pyramidal tracts and posterior columns, though they mostly suffered from varying degrees of "electric feet," and some showed evidence of optic neuritis, while Cases I, IV, V, VII, VIII, IX, XIX, XXI and XXII—who, in general, had signs of advanced posterior column damage—were free from oedema during their entire captivity, and the two spastic cases also gave no history of it. Some cases, such as XXII and XXIV, gave a history of slight oedema, but neither of these cases showed very gross cord signs. It is especially remarkable when one bears in mind how profound and widespread the oedema was. Cases XXIII and XXVII are included for this purpose. Case XXIII is of interest partly on account of his oedema, which at one stage came up to the umbilicus, but also in view of the fact that he survived a subacute dysentery whilst in camp. Case XXVII was a remarkable case: his experiences in camp may not be unique, but they are certainly most exceptional—he was condemned and later reprieved, starved to a stage when he was unable to stand, and driven at work beyond the normal limits of endurance—and yet he escaped without any evidence of central nervous system damage. His oedema was at times gross—he describes himself as being "blown out like a balloon" on occasions—though for no apparent reason this would wax and wane. No adequate explanation is offered for this and it does not appear to have been noted by other writers, though it has been indirectly hinted at. Dansey Browning and Rich (1946), for example, when discussing optic neuritis state that 2 of their cases had had wet beri beri, 3 both wet and dry, and 22 dry beri beri, which is probably of significance as wet beri beri appears to have been much the commoner (Smith, 1946).

Anatomical and Pathological Considerations

Up to the present no satisfactory reports of autopsy findings in ex-Japanese prisoners are available, but a fairly accurate picture can probably be composed from our knowledge of the post mortem findings in allied diseases, notably classical beri beri, pellagra, peripheral neuritis, pernicious anaemia with nervous system involvement, the toxic amblyopias and Leber's disease, and perhaps also tabes. The relationship to subacute combined degeneration of the cord is clearly a very close one, and it seems probable that the two diseases are basically the same, the difference being mainly in the prevalence of the individual lesions; there are, however, certain differences which can be summarized briefly as follows:—

(1) The presence of achlorhydria and megalocytic anaemia is not necessary nor indeed common.

(2) The greater frequency of optic atrophy in nutritional neuropathy.

(3) The comparative rarity of pyramidal tract involvement and, when this is present, the posterior columns appear to be spared.

(4) The more frequent retention of the deep reflexes.

(5) The absence of sphincter troubles except in the terminal stages.

(6) The greater preference for the lower limbs.

Nutritional neuropathy also generally shows a greater proportionate loss of posterior column sensation, possibly due to the fact that the posterior roots themselves are involved, and in this respect it bears some resemblance to tabes.

The lesions in nutritional neuropathy divide into two main groups which may or may not be associated in any given patient, but which are probably dependent upon the same basic aetiological factors; these are peripheral neuritis and involvement of the central nervous system.

Peripheral neuritis.—The changes in beri beri have been described in detail by Vedder (1938), and those of pernicious anaemia by Russell, Batten and Collier (1900), Greenfield and Carmichael (1935)—who removed portions of the anterior tibial nerve in living patients—and Foster (1915), and they do not differ greatly from those of peripheral neuritis generally. There is degeneration of the peripheral nerve, more especially in their distal ends, varying from slight medullary destruction to complete Wallerian degeneration, all the nerve elements being involved, though the medullary sheaths are the chief sufferers, these being broken up into droplets of fat. The axis cylinders do not show such profound changes, but in some cases become fibrillated and show varicose swellings.

These [illegible] that both the spinal and cranial nerves and degenerative changes may be detected in the nerve centres and throughout the implicated neurones and degeneration of the vagus with changes in the root of the fourth ventricle is described. Similar changes may occur to a larger degree in the nerves of the sympathetic system and in the anterior horn cells leading to a secondary atrophic degeneration of muscles.

Nutritional amblyopia. The term "retrobulbar neuritis" has been extensively used in the literature but it is doubtful whether it is really justifiable. There are little or no signs of inflammation in any of the nervous lesions and it is more probable that the changes in the eye are of the same order and that the transient phase of nerve head congestion occasionally witnessed in the early stages is due to vascular engorgement secondary to changes in the degenerating nerve.

As has already been shown the characteristic changes in the eye are pallor of the temporal half of the disc and the presence of central or paracentral scotomata. These changes correspond to a degeneration of the papillo-macular bundle. If a surface view of the optic nerve head is divided into 12 segments of the 6 in the temporal half four twelfths are reserved for the macula leaving only one twelfth in the upper part of the temporal half and one twelfth in the lower part for the region of the retina temporal to the fixation point (Evans, 1939)—it is exactly this area which shows secondary optic atrophy.

Central and paracentral scotomata have long been known to be associated with lesions of the papillo-macular bundle and Leber's optic atrophy, which gives a large central defect, has been shown to be due to an atrophy of the papillo-macular bundle.

Whether any other fibres are involved is not at present known but it is only in the most severe cases that more widespread lesions are detected.

Central Nervous System Changes Apart from the Eyes

We have already seen that the main central nervous system symptoms are widespread loss of vibration sense and to a lesser extent tendon and joint sense with inco-ordination and ataxia all very much more marked in the lower limbs than elsewhere but unaccompanied by changes in the appreciation of pain temperature and light touch except in the glove and stocking areas. More rarely there is spasticity and there is some evidence in favour of impairment of the higher faculties at any rate in some patients. There is therefore a selective vulnerability of the proprioceptive as opposed to the exteroceptive sensory mechanism with occasional involvement of the pyramidal tracts.

In this respect the pathological changes recorded by Greenfield and Holmes (1939) in a fatal case of pellagra are of interest as it is highly probable that the changes in nutritional neuropathy are more or less similar. Degenerative changes were present in many ganglion cells especially the anterior horn cells of the spinal cord and in the cells of the cranial motor nuclei and the Betz cells of the motor cortex were especially affected. There was degeneration [illegible] indirect [illegible] the posterior [illegible] combined degeneration.

In the [illegible] the changes one would expect in nutritional neuropathy, with the [illegible] proprioceptive loss in the lower limbs, though [illegible] changes and there is widespread pyramidal damage.

It is [illegible] therefore that the individual parts of the central nervous system [illegible] in the following order of frequency:—

(1) The papillo-macular bundle.

(2) The posterior columns, but especially the column of Goll (fasciculus gracilis), and associated with these the direct and indirect spinocerebellar tracts.

(3) The pyramidal tracts.

The degree of involvement of the cerebral cortex is unknown, but cortical atrophy coupled with mental changes has been described in subacute combined degeneration (McAlpine, 1929) and for reasons given above they are believed to be fairly common, though usually of a mild degree, in nutritional neuropathy.

Two main groups of tracts are apparently spared: the exteroceptive sensory system and the tracts descending from the basal ganglia into the cord.

The question now arises as to why these tracts are selected and what factor or factors are responsible for this distribution, and whether any reasonable explanation can be afforded on structural, vascular, embryological or phylogenetic grounds.

There have been several references in the literature to the prevalence of hypertension in prison camps (Harrison, 1946) and this, coupled with the knowledge that a varying degree of anaemia was often present, raised the question of the vascular supply to these parts. It will be noted that the state of the cardiovascular system, together with the blood pressure readings, is recorded in the cases reviewed here, but no great deviation from the normal was found, the blood pressure being slightly raised in a few but probably not more so than in any comparable group of individuals. It is therefore presumed that if hypertension was present beforehand it had subsided soon after release. Actually, none of these patients had his blood pressure recorded during captivity, nor is it known whether those suffering from hypertension were more prone to neuropathy than were the remainder.

Now, as regards the blood supply to the macula, the central retinal artery arises from the ophthalmic artery at the apex of the orbit and runs forward on to the optic disc, and when it enters the eye it breaks up into a series of smaller vessels. The whole retina is uniformly supplied with the exception of the macular region, around which the vessels sweep in wide curves leaving a small central area round the fovea which is entirely avascular.

The spinal cord is supplied by two anast[illegible] arterial systems—the anterior spinal arterial system and the [illegible] between the layers of the pia mater along the entire extent of the cord. The anterior spinal artery supplies the central half of the cord [illegible] and the anterior horn, the central canal and Clarke's column [illegible] of the grey matter of the cord and also the pyramidal and spino-thalamic tracts. The two posterior spinal arteries, one on each side, run downwards on the back of the cord close to the posterior roots and send off branches which anastomose freely with the anterior spinal system forming a belt round the cord (the vaso corona). These posterior spinal arteries supply the posterior columns. Both of these arterial systems anastomose freely outside the cord but once they have penetrated it they are end arteries and do not anastomose. Thus it should be noted that the grey matter with the antero-lateral columns on the one hand, and the posterior columns on the other, receive their blood supply from different arterial systems.

It is just possible therefore that the question of vascular supply may play some rôle, observing that the macula is relatively avascular and that the posterior columns have an independent blood supply, but it is improbable that it plays a predominant rôle. As regards the macula a close relationship has been shown to the toxic amblyopias and yet these can be caused by tobacco (which is a vaso-constrictor) and alcohol (which is a vaso-dilator). Furthermore, Clarke's column—where the ascending cerebellar tracts are relayed—is supplied by the anterior spinal artery, yet it is believed that these are involved at the same time as are the posterior columns and at a time when the pyramidals may be spared.

The embryological and phylogenetic development of the central nervous system run approximately parallel, and as it is on the whole easier to give examples from comparative anatomy this aspect will now be considered.

The macula is entirely absent in fishes and shows its earliest beginnings in reptiles, but it is not until birds are reached that a well developed macular area can be traced. In mammals the central area is absent in some (rat, mouse, sheep), some specialization is present in others, but it is only in monkeys and man that there is a true macula with a fovea subserving binocular and stereoscopic vision, and even then it is poorly developed in the lemurs and primitive monkeys.

The posterior columns are composed of endogenous and exogenous fibres: the endogenous fibres arise within the cord and pass up or down for a few segments and serve to connect the neighbouring segments; the exogenous fibres arise in the posterior root ganglia and divide into three groups—short fibres which pass into the grey matter and end round the anterior and posterior nerve cells and on whose integrity the deep reflexes depend, medium fibres ending in Clarke's column which in turn gives rise to the spino-cerebellar tracts, and long tracts which pass up to the nucleus gracilis and nucleus cuneatus. As the deep reflexes are usually retained in nutritional neuropathy it is probable that the short exogenous fibres are spared. In fishes the posterior columns are very small and the posterior horns lie close together; the only [illegible] fibres connecting different levels of the cord and these [illegible] gracilis and no medial lemniscus. Amphibians show a slight advance; the nucleus cuneatus and gracilis are lacking, but in certain frogs the posterior columns do make up about 12 per cent. of the total white matter in the upper cervical region. To some extent this is a false figure, as the spinal trigeminal root and also part of the vestibular and vagal roots descend a long way in these columns. The remaining fibres are the segmental connecting fibres present in fishes and the shorter fibres probably connected with reflex action.

Reptiles show the first beginnings of the posterior column with their medullary nuclei; in marsupials they are still small (nucleus cuneatus being the larger), but in monkeys there is an appreciable increase especially in the nucleus gracilis, which is probably linked with the role of the tail in arboreal life.

If therefore a comparison is made between the reptiles and mammalian cords, the difference in size of the posterior column is obvious, for this relative increase in mammals is a progressive increase from the lower to the higher levels: in reptiles the relative accumulation between the lumbar and upper cervical cord is about 5 per cent., whereas in man it is more than 100 per cent. The percentage relationship of the posterior column to the grey substance in the cervical region shows this increase fairly well: in the bear it is 106, in monkeys (cebus) 112, in man 185.

Embryologically, too, the posterior columns are of late development: the posterior white columns (from which the fasciculus gracilis and cuneatus are derived) appear about the tenth week, by which time the anterior and lateral columns (carrying spinothalamic sensation) are already established.

All this fits in with the conception that the sensation of pain, temperature and general tactile sensibility (possibly a primitive muscle sense) which are found in the ventrolateral and lateral columns in mammals (as in amphibians) are phylogenetically old, while the paths for tactile discrimination and for highly developed proprioceptive pathways assume an ever increasing importance as mammals are reached and the body is balanced on four legs; they become predominant in arboreal life as they permit the acquisition of better judgment of spatial relations, and the tract of Goll is of special importance in man with his upright stance.

We have seen, therefore, that it is the long tracts in the posterior columns which are the youngest phylogenetically, more especially those subserving the lower limbs, and it is of interest to note that in some ways these tracts are analogous to those in the eye. The sensory epithelium of the cones corresponds to the end organ of sensation in the muscles, and the bipolar cell of the retina—small though it is—to the tract along the sensory nerve through the dorsal spinal root, and up the posterior column to the nucleus gracilis or cuneatus, these two nuclei being analogous to the ganglion cells of the retina. From the nucleus gracilis and cuneatus run the deep arcuate fibres through the sensory decussation of the mesial fillet to the optic thalamus, the analogous structures in the visual path being the optic nerve, chiasma and [illegible] in the primary visual centres (lateral geniculate body and [illegible]). The last journey from the thalamus to the cortex is [illegible] by the geniculo-calcarine pathway to the occipital cortex.

Intimately linked with the posterior columns are the direct and indirect cerebellar tracts which carry muscle tone sensation and the impulses for maintaining equilibrium. The oldest afferent tracts to the cerebellum are those of the vestibular and, in fishes, the lateral line system, the latter becoming connected in the higher forms with the various conductors of the proprioceptive impulses. In fishes the spinocerebellar tracts are very poorly marked, and it is probable that the cerebellum receives only static (as opposed to kinetic) impulses, but there are some spinocerebellar fibres in fishes (at any rate in sharks), the fibres originating homolaterally in the cervical region and being analogous to the dorsal cerebellar tracts. The ventral spinocerebellar tracts cannot be demonstrated with certainty.

Amphibians vary greatly according to the development of the tail, the tailless forms showing a more highly developed cerebellum, but it is not until mammals are reached that it plays an important part. In fishes, amphibians, reptiles and birds the paleocerebellum only is found; the neocerebellum starts to appear in marsupials and becomes progressively bigger, being largest in man. All this is linked with the fact that mammals are predisposed to a very labile type of equilibrium and are to some extent dependent on the spinocerebellar tracts for the maintenance of this.

The spinocerebellar tracts are, therefore, slightly older than are the long tracts of the posterior column. Greenfield and Holmes found them involved to a lesser degree than were the posterior columns in their fatal case of pellagra, and the widespread loss of vibration sense as opposed to muscle joint sense in nutritional neuropathy makes it probable that this is the case here too.

By way of contrast, the history of the exteroceptive pathways can be considered briefly. The spinothalamic tracts are comparable to the spino-mesencephalic and spinobulbar tracts of submammalian forms and are descendants of the secondary sensory tracts in the lower vertebrates. They are already well established in fishes and phylogenetically they are the oldest ascending tracts in the cord.

The pyramidal tracts.—The oldest motor fibres are the vestibulospinal tracts, already well developed in fishes; the rubrospinal tracts appear in reptiles and are well developed in birds, but it is not until mammals are reached that the pyramidal tracts can be distinguished with certainty. In some marsupials they run entirely in the posterior column; in rodents the tracts cross and run directly to the anterior horn cells; in ungulates the tracts are well developed, but it is only in primates that they extend to the last sacral segment. This is of course linked up with the increasing physiological influence of the cortex. The percentage of the cervical cord occupied by the pyramidal tracts is approximately as follows: marsupials 4 per cent, dogs 7 per cent, monkeys (cebus) 10 per cent, and man 30 per cent. The percentage of tracts decussating is somewhat variable, though on the whole it increases *pari passu* with the phyl[illegible] and [illegible]. The [illegible] tracts are there[illegible] development [illegible].

So far then we have seen that the degree of involvement [illegible] central nervous system [illegible] proportional to the [illegible] except that the peripheral [illegible] proportion [illegible] sensation tends to be affected earlier and more severely than does motor function. The nervous patterns produced by peripheral neuritis vary according to the causative toxin: some like lead are almost entirely motor, others like diphtheria are mixed, while thiamin deficiency and alcohol produce a neuritis affecting mostly the sensory mechanism. Nutritional neuropathy belongs to this last group; the peripheral neuritis affects both the posterior root ganglia and the anterior horn cells but the degree of sensory involvement is proportionately much the greater. We can assume therefore that, [illegible] allowance is made for the fact that in nutritional neuropathy there is an obvious affinity for the sensory as opposed to the motor mechanism both in the central and in the peripheral nervous system, the chief influencing factor is that of the phylogenetic seniority of the individual tracts in the central nervous system. Vascular supply may play some part, especially in the [illegible] of the [illegible] but it is doubtful if its role is very great.

[illegible] processes and [illegible] inflammatory diseases of the central nervous system often prefer the younger tracts as Edinger, Vogt and [illegible] have pointed out, but usually only one or two tracts are involved. In nutritional neuropathy, however, perhaps more than in any other disease process, the tracts are selected on this basis; those tracts which are best developed in man suffering most—the papillo-macular bundle, the long tracts of the posterior columns (while the shorter and older tracts in these escape), [illegible] the spino-cerebellar tracts and the pyramidal tracts.

SUMMARY

The outline of the syndrome of nutritional neuropathy as seen in prisoners of war released from Japanese internment camps has been given, and the [illegible] together with the clinical findings in patients seen in this [illegible] months after release has been described. A brief history and [illegible] the clinical findings of 27 selected cases is included to illustrate these points. Associated deficiency diseases which were rampant in camps [illegible] and from which many of these patients suffered have for the most part not been mentioned except where they had a direct bearing on the nervous condition. The question of what nutritional factors were responsible for these disorders of the nervous system has not been discussed in detail though the main known facts have been summarized. The presumed pathology based on the clinical findings and the known post-mortem results in other [illegible] has been reviewed, followed by a discussion on what factors control the distribution of lesions. Though the vascular supply may play an important part, the main factor has been shown to be the question of phylogenetic seniority, the younger tracts being selected first, though the sensory mechanism is relatively more sensitive than is its motor counterpart.

[illegible]

[illegible] 125 lbs. [illegible]

[illegible]

[illegible] 1942 [illegible] which [illegible]

[illegible]

[illegible] walking [illegible] A month or [illegible]

[illegible]

[illegible] walked [illegible]

[illegible] December 1941 [illegible] in 1939 which [illegible]

[illegible] reasonably [illegible] attacks of [illegible]

[illegible] His weight [illegible]

[illegible] walk [illegible]

[illegible] legs [illegible]

[illegible] 1946 [illegible]

[illegible] aged 44.

[illegible]

In 1943 [illegible] general condition [illegible] the dark.

[illegible] September 1945 [illegible]

[illegible] 150/90 [illegible] system. Musculature [illegible] the ankles. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] became grossly defective and about this time soreness of the [illegible] [illegible] on the exposed parts of the body made their appearance.

[illegible] his term of imprisonment he received at one time and another small [illegible] [illegible] and vitamin injections. It is doubtful if these [illegible] [illegible] the [illegible] pains in the legs though the patient was of the opinion that his [illegible] with treatment or at least was prevented from deteriorating [illegible]

[illegible] liberated in September 1945 and eventually evacuated to the United [illegible]

When examined in March 1946 he had regained his former weight. He had clearly [illegible] his vision which was formerly defective had not returned [illegible] it was very much better. During 1943 he had been [illegible] people unless they were very close and quite unable to read [illegible] at a normal distance. His vision was now 6/24 in both [illegible] though a central scotoma persisted. Both discs [illegible] temporal pallor. There was a moderate degree of nerve deafness [illegible] normal [illegible] to 18 feet on both sides. Otherwise the cranial [illegible] normal. The [illegible] system revealed no abnormality: blood [illegible] was not greatly wasted though power was [illegible] the lower limbs. Both superficial and deep reflexes [illegible] knee jerks were present though weak but the ankle jerks could not [illegible] light touch and pin prick over the glove and stocking [illegible] in the lower limbs and complete loss of vibration sense [illegible] great toes in the toes and impairment at the [illegible] with a high stepping staggering gait and Rombergism [illegible]

[illegible] abnormality except for the fractional test meal [illegible] histamine free hydrochloric acid [illegible]

[illegible]

[illegible] H.M.S. *Encounter* off the coast of Java [illegible] getting on board a small [illegible] the next evening he was picked up by [illegible] and taken to Macassar where he spent [illegible]

[illegible] months of captivity but for the [illegible] prisoners and [illegible] During 1943 the food deteriorated both in [illegible] strict and he was in two [illegible]

[illegible] treated with quinine and in August [illegible] some six weeks. In [illegible] of the skin at the angles of [illegible] of the scrotal skin and [illegible] blepharospasm and severity [illegible] The eye symptoms later [illegible]

[illegible] attack of diarrhoea and was treated [illegible] state of profound [illegible] 1945 he had an attack of dengue fever which lasted for [illegible] sight followed by itching [illegible] At one time he felt as if the [illegible] walking properly. By March [illegible] though there

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] and 30

[illegible]

6/24 both eyes and both optic discs showed slight temporal pallor. [illegible] visual fields showed slight peripheral loss in the upper fields, more marked on the [illegible] the right, with a small relative central scotoma in the right eye. The central [illegible] appeared normal and the cardiovascular system revealed no abnormality. Blood pressure [illegible] 130/80. The tendon reflexes were normal except for the absence of ankle jerks. [illegible] sensory changes to be made out were [illegible] slight loss to light touch over the [illegible] and toes and a possible diminution of vibration sense at the ankles. [illegible] and co-ordination unimpaired.

Case XVII.—Able Seaman, aged 42

This patient was taken prisoner at Hong Kong in December 1941.

Early in 1942 he began to experience dizziness and headaches followed [illegible] months later by soreness of the tongue and "electric feet." In September 1942 he [illegible] from Hong Kong to Tokyo under extremely crowded and unpleasant conditions [illegible] the voyage his vision rapidly deteriorated so that within a few days he [illegible] light perception only, which condition persisted for some nine days and then [illegible] sufficiently to permit him to make out the [illegible] outlines of people.

The next three months were spent at Shinagawa camp in Japan [illegible] of rice three times a day with a mixture of boiled rice [illegible] occasional small pieces of meat or fish. His vision cleared. He could [illegible] his way about but could not read. His main complaint at this time being the [illegible] in his feet, which prevented sleep and caused him acute discomfort as the weather became colder. He was transferred to Omori camp in June 1943 and put to work on [illegible] hard manual work but which allowed meagre supplementation of the diet. Except for an attack of diarrhoea in June 1945 he remained fairly well but [illegible] sight and painful feet until his release in August 1945. There was no [illegible] degree of [illegible].

When examined in March 1946 he appeared to have made an extremely good recovery. His visual acuity was then 6/12 both eyes, the outer part of both optic discs was slightly pale though not definitely pathological, the visual fields [illegible] there was a little peripheral loss in the superior portion of both fields but no scotomata could be demonstrated. The cardiovascular system was normal. Blood pressure 120/75. No abnormality could be detected in the central nervous system on complete examination.

Case XVIII.—Able Seaman, aged 35

This patient was taken prisoner in March 1942.

He remained well until the following September, when he noticed [illegible] of both eyes, and during the next six or nine months the trouble progressed until he could not recognize people beyond a distance of about three feet and could not read at all. No accurate assessment of his vision was made at any time [illegible] and he never had any other neurological complaints, though he suffered from [illegible] dysentery and an attack of so-called pneumonia during this time.

He was released in September 1945 and made a rapid [illegible] in April 1946 there was very little abnormal to be detected beyond a slight impairment of vision (6/12 both eyes) which could not be improved with glasses. His discs and retinal vessels appeared normal and his visual fields were full [illegible].

He returned to full duty.

Case XIX.—Petty Officer, aged 32

This patient was taken prisoner at Hong Kong in December 1941.

In February 1942 he had [illegible] and prolonged attack of diarrhoea, and during the spring [illegible] that time he noticed [illegible] progressive weakness of his legs so that by May 1942 he was unable to walk, although up till then his eyesight and the power in his arms had remained intact.

About June 1942 he began to experience dimness of vision and [illegible]

G

[illegible] of the arms followed that summer by burning pains in the feet. He became almost helpless, though his strength and general condition varied, but at the best he could only get about with the aid of sticks, and in that condition he was liberated in September 1945. About July 1942 he had been given thiamine and nicotinic acid tablets [illegible] which this does not appear to have had any very dramatic effect [illegible] [illegible] and weakness but it did lead to a very marked improvement in his eyesight. Before this [illegible] he was unable to play cards whereas afterwards he could read with comparative ease.

When examined in March 1946 his visual acuity was 6/12 both eyes. Both discs showed sharp [illegible] edges and definite temporal pallor, and perimetry revealed small relative and absolute central scotoma. The cranial nerves were otherwise normal. The cardiovascular system was normal except for a tendency to bradycardia. Blood pressure 130/85. Muscular system showed slight hypotonia and generalized wasting but no great weakness, and the reflexes were normal except for the complete absence of the knee and ankle jerks. There was a fairly marked glove and stocking anaesthesia extending to the knees and just above the wrists, and complete loss of vibration sense from the iliac crests and sacrum downwards. Position sense was absent in the toes and diminished at the ankles. The gait was ataxic with moderate Rombergism.

Case XX.—Paymaster, aged 53.

This patient went to Hong Kong in 1936 and was taken prisoner in December 1941. In July 1942 he had [illegible] of the right eye and ulcer on his leg but these appeared to have cleared up after a few months. In September 1942 he noticed that his sight was rapidly deteriorating,—he could no longer read and was unable to recognize people at any distance.

Early in 1943 he began to experience electric feet, which steadily became worse through the rest of the year. At the end of 1943 he developed swelling of the feet and ankles, after which the pain began to subside. Soreness of the tongue and lips and mild digestive symptoms continued to be troublesome, and during 1944 he had three attacks of jaundice and [illegible] attacks of malaria. Towards the end of 1944 swelling of the feet [illegible] spread above the knees, and the [illegible] of the extremities of the limbs below the knee.

He was released in September 1945.

When examined in April 1946 there was slight generalized wasting, though no oedema. Both optic discs showed patchy temporal pallor [illegible] [illegible] sides and perimetry revealed a fairly well marked central scotoma [illegible] [illegible] bilateral [illegible] limiting [illegible]. The cardiovascular system was normal for his age. Blood pressure [illegible]. [illegible] symmetrical and physiological except for [illegible]. [illegible] slight loss of light touch over the feet and ankles, though the [illegible]. Vibration sense was just appreciated at the knees though absent below [illegible]. [illegible] the lower limbs below the knees and gait was [illegible].

Case XXI.—Warrant Officer, aged 38.

This patient was taken prisoner at Hong Kong in December 1941.

In March 1942 he had a severe attack of diarrhoea and was admitted to hospital where the diarrhoea continued though [illegible] until about August 1942, when it started to clear up. It was [illegible] that he began to complain of aching and pains in both feet [illegible] September 1942 he developed [illegible] the next few months.

In November 1942 he developed swelling of both feet and ankles [illegible]

[illegible] In August 1943 he developed [illegible] to a very rapid deterioration [illegible] light perception only and [illegible] reaction to pupil movement. In March 1944 [illegible]

He [illegible] 1945 very [illegible] during the previous two and a half years.

When [illegible] in January 1946 he was in a fairly good state [illegible]. Both optic discs [illegible] rather pale, showing well marked atrophy [illegible] both temporal [illegible] and fairly large central scotomata [illegible]. [illegible] vascular system was normal; blood pressure 110/75. [illegible] and reflexes were [illegible] equal except that the [illegible] plantar [illegible]. Glove and stocking anaesthesia was fairly marked [illegible] amounting to pronounced blunting of light touch and pinprick [illegible] and to a lesser extent in the hands. Vibration [illegible] limbs including the iliac crests and sacrum [illegible] impaired in the feet. [illegible] the sole of [illegible] and there was fairly marked Romberg's sign.

Case XXVII. [illegible] aged [illegible]

This patient was taken prisoner at Hong Kong [illegible]. His previous medical history included two attacks of syphilis [illegible] one in 1938 and the other in 1940. He had had [illegible] while he was taken prisoner. He had had [illegible] attack [illegible].

He remained fairly well until April 1942 when he began [illegible] especially towards evening and [illegible]. Weakness of the legs [illegible]

In January 1943 he had an attack of [illegible] his vision was defective and this progressed [illegible] Red Cross [illegible] apparently [illegible].

He improved fairly rapidly after [illegible] 1946 his [illegible] was 6/18 both eyes. Both discs were [illegible] but there was a considerable degree of pigmentation [illegible] right [illegible] formerly showed a central scotoma [illegible] right. The cranial nerves were [illegible] which [illegible] found to be due to [illegible] was normal; blood pressure 135/80. [illegible] affecting [illegible] changes. There was slight blunting of light touch and pinprick [illegible] stocking [illegible] sense was lost [illegible] the knees [illegible] position [illegible] ankles [illegible]. There was marked [illegible] in the hand [illegible] normal limits.

Case XXVIII. [illegible] aged [illegible]

The patient was taken prisoner in February 1942 [illegible].

He remained fairly well until August 1942 when he had [illegible] and was in hospital for two months [illegible] followed [illegible] numbness and occasional burning pain [illegible]. In March 1943 he had an attack [illegible] sudden and severe [illegible] member the outstanding feature of this illness [illegible] the [illegible] of the ankles [illegible] appearance and slightly [illegible] involving the scrotum—a state of affairs which continued, waxing and waning, [illegible] until his release in September 1945.

A month after his release he developed the classical signs of partial intestinal obstruction and on 3rd November 1945 he was operated on in the 10th General Hospital, Singapore, when an adherent and fibrosed appendix which was attached to [illegible] with a band of omentum which was obstructing the ileum was removed, after which he made an uneventful recovery and was later evacuated to the United Kingdom.

When examined in February 1946 his main complaint was weakness of his legs on exercise; this, he said, had been present since the oedema first made its appearance and had not improved to any great extent. Clinical examination was essentially negative as far as his central nervous system and locomotor system were concerned, and there was no evidence of nutritional amblyopia or of any sensory loss. The power in the lower limbs below the knee was perhaps somewhat below normal for a man of his age, but the reflexes remained symmetrical and physiological and co-ordination was unimpaired.

Case XXIV.—Electrical Engineer, aged 41.

This patient went to Hong Kong in 1938 and was taken prisoner in December, 1941.

In February 1942 he had an attack of dysentery lasting for about three weeks, and in the autumn of that year he began to suffer from swelling of both legs; this progressed steadily until both lower limbs and the scrotum were involved. This state of affairs continued, waxing and waning, throughout his term of imprisonment. In December 1942 he noticed defective vision of both eyes, much more marked on the right side, and this steadily progressed until he was almost blind in the right eye, while vision in the left eye was sufficiently defective to render reading impossible. In April 1943 he began to vomit after meals, and later developed epigastric pain coming on more or less immediately after meals, and he was admitted to hospital with a diagnosis of ulcerated stomach. Whilst in hospital he had a limited number of nicotinic acid and thiamine injections and improved considerably, especially as regards the swelling of the legs, which more or less cleared.

In December 1944 the oedema again became troublesome, a state of affairs which continued until his release in September 1945.

Examination revealed a man rather old for his years and one who had made a [illegible] psychological readjustment to civilian life. It was not easy to separate the psychological from the organic, but he did appear to have an abnormally poor memory, poor power of grasp and to some extent a poor vocabulary. He was almost blind [illegible] right eye, vision being limited to the counting of fingers, and that of the left eye was 2/60. Heavy pigmentation was present in both eyes and there were marked choroido-retinal degenerative changes in the periphery of both eyes. There was no direct [illegible] and it was considered probable that the above changes [illegible] relation. His cardiovascular system showed an [illegible] blood pressure 115/90. Both the capillary and arterial circulation in the [illegible] limbs were normal. The only changes to be detected in the central nervous system were slight loss of vibration sense and sense of position in the feet and [illegible] and some degree of clumsiness [illegible] with his lower limbs. Frank Romberg's sign was absent.

Case XXV.—Miner, aged 28.

[illegible] taken prisoner in December 1941 at Hong Kong, where he spent [illegible] term of imprisonment.

[illegible] June 1942 he noticed weakness of his left leg when he walked, and later [illegible] and unsteadiness in his gait, so that he staggered about [illegible] and had to use a stick for walking. He [illegible] at this time, though he was [illegible] Towards the end of June 1943 [illegible] which affected the whole field of vision of both [illegible] and but could [illegible]. [illegible] by gradual [illegible] tinnitus or vertigo [illegible] weakness.

In August [illegible] found that his [illegible] phonation [illegible] failing—[illegible] to talk he stammered and stuttered, but [illegible] a word and [illegible] a sentence was begun it could usually be completed successfully. This lasted [illegible] a fortnight and then began to clear. There was never any difficulty in swallowing [illegible] in common with [illegible] this period he experienced some urgency of micturition though there was never any incontinence. He was admitted to hospital and treated with daily thiamine injections for about a month in addition to some vitamin pills [illegible] and on this he improved [illegible] so that by the end of September he could [illegible] normally and could read.

Shortly after this he noticed [illegible] in his left lower limb from [illegible] the knee downwards—he could [illegible] and touch [illegible] burning, [illegible] feeling, pain [illegible] gradually cleared during the next few months. During 1943 he improved [illegible] as far as his nervous system was concerned his chief complaint [illegible] he was unable to walk about without a stick and [illegible] heavy work until his release in August 1945.

During his term of imprisonment he had two attacks of malaria but no dysentery and during 1944 he suffered from tape worm which was apparently [illegible] complete following some form of treatment.

For the first year the diet consisted of about 10 to 12 oz. of unpolished rice per day supplemented by occasional pieces of meat, sweet potatoes, turnips and cabbage, dandelion leaves, stale fish, bad eggs, a teaspoonful of butter every [illegible] and sometimes fried fish and dates. There was no fresh fruit and [illegible] cheese or milk. At the end of 1942 the Chinese Red Cross supplied some peanut butter, honey and jam. During the latter part of 1944 and during 1945 conditions were very poor. The diet consisted almost solely of unpolished rice and various vegetables, mostly [illegible] (a variety of [illegible] grass).

When examined in May 1946 his general condition was good. Vision was 6/9 both eyes and fields full by perimetry but Bjerrum screen revealed enlarged blind spots and bilateral paracentral scotomata. There was slight pallor of the temporal side of the left disc and some pigmentary disturbance around the left macular region. The other cranial nerves, including hearing, were normal. The cardiovascular system was normal, blood pressure 130/90. Development, tone and power of the upper limbs were normal and [illegible] co-ordination was slightly impaired [illegible] of the left hand and there was a slight [illegible] tremor of both hands. Development of the lower limbs was good [illegible] slight increase of [illegible] in the left as compared with the right; power [illegible] right lower limb [illegible] some weakness of flexion and abduction of the left thigh and flexion of the left knee and some slight uncertainty of co-ordination [illegible]. He walked steadily with [illegible] spasticity or difficulty but was slightly unsteady when asked to [illegible]. Romberg's sign was negative and he could [illegible]. Sensation was normal including vibration, joint and [illegible]. Reflexes were [illegible] in the upper limbs; both knee-jerks were very [illegible] on the left while the ankle jerks [illegible]; both plantar responses [illegible]. The abdominal reflexes were normal.

Investigations [illegible] as follows: Wassermann reaction and Kahn test [illegible] cerebrospinal fluid showed [illegible] 160 and was normal in all respects including colloidal gold curve. Examination of the urine, faeces and blood [illegible].

He [illegible] considerable improvement with the [illegible] exercises designed to re-educate the [illegible].

Case XXI [illegible] aged 35.

The patient went to Hong Kong in 1938 and [illegible] taken prisoner in December 1941.

[illegible] 1942 he noticed weakness of the right lower limb which progressed for [illegible] months and then became stationary; there had been [illegible] the other lower limb though he had had a few sores on the [illegible]. December 1942 he noticed his vision becoming blurred and reading became [illegible] difficult. During 1943 his general condition remained unchanged—his vision remained poor but did not deteriorate further, and his right lower limb remained weak [illegible] to get tired more easily than did the left. On the whole, however, his chief complaint appears to have been nocturnal frequency of micturition which was common to [illegible] members of the camp and which prevented sleep.

He was liberated in September 1945; after this his eye trouble cleared rapidly but [illegible] appears to have taken place as regards his legs.

When seen in August 1946, both discs showed well marked temporal pallor and there [illegible] bilateral central scotoma. Apart from a very slight bilateral inner ear deafness probably not pathological at his age, the cranial nerves were normal. The cardiovascular system was normal except for extrasystoles; blood pressure 120/80. There was slight generalized wasting of the musculature generally, more especially in the right thigh which measured [illegible] inches at 10 inches below the anterior superior spine [illegible] inches less in the left thigh. Tone was perhaps slightly in excess of normal [illegible] both lower limbs but was more marked on the right side where it amounted to a [illegible]. The abdominal reflexes were poorly marked, especially on the [illegible] side, where they were only just obtainable. Both knee jerks and ankle jerks were [illegible] with poorly sustained ankle clonus on the right side. Right plantar reflex [illegible] left plantar reflex doubtful. There were no sensory changes to be detected.

Ancillary investigations, including examination of the cerebrospinal fluid, were [illegible].

Case XXVII. [illegible] R.N., aged 45.

[illegible] taken prisoner in Hong Kong in December 1941.

[illegible] kept in good health until September 1943 when he was [illegible] charged with espionage, and during his period of [illegible] about six weeks and during which time he had almost [illegible] progressively weaker and numb. At the end of the trial he [illegible] both arms and legs felt dead and numb and he [illegible] could hardly turn over when lying down. He was then sentenced [illegible] and four of the party were beheaded though [illegible] was changed to five years imprisonment. At this stage he [illegible] thiamine and a little more food, after which [illegible] he was able to stagger about and he became a convict in a local [illegible]. As the convicts of various nationalities

[illegible] and during the next six months the [illegible] but towards the end of 1944 his feet became generally [illegible] painful. Throughout this time [illegible] was marked [illegible] mornings he could take [illegible] that would persist for six months [illegible] normal [illegible] and the [illegible] on waking in the morning and [illegible] striking [illegible] the next day [illegible] swelling of the arms and face. Walking [illegible] weakness and oedema, and in that condition [illegible] numbness and occasional pains in the hands and [illegible] in September 1945.

He [illegible] detailed neurological examination in [illegible] 1946 [illegible] results.

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BLOOD TRANSFUSION IN THE TREATMENT OF SHOCK IN THE ROYAL NAVY

BY

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Six years of battle experience in treating the condition generally described as shock which may occur when men are seriously wounded or burnt have clearly indicated the important role of early and adequate replacement of the diminished circulating blood volume by the transfusion of blood or blood products

Numerous wartime writers have described the symptomatology and discussed the causative mechanisms and treatment of this syndrome, and naval experience has little to add to the concise early accounts of Whitby and his colleagues of the Army Blood Transfusion Service (Kekwick *et al.* 1941*a*; Maycock and Whitby 1941*b*), to the review of transfusion hazards by Whitby in the Harveian Lecture of 4th May, 1942, or to the evidence collected by the Army and Medical Research Council teams in the field (1943 and 1945) which is summarized in the second edition of War Memorandum No. 1 (1944) of the Committees on Traumatic Shock and Blood Transfusion Research of the Medical Research Council.

The preface to the latter memorandum stresses the non-specific nature of the syndrome and the need for further research on all aspects of the reaction of the body to injury, and draws attention to the extensive revision of ideas necessitated by experience since the first edition was published in 1940. This gives some indication of the advances made during the war years. The change in outlook in the Royal Navy was probably even more dramatic.

At the beginning of the 1939–1945 war many thought, with the naval surgeons of the 1914–1918 war, that blood transfusion in ships was not a practical proposition. In the closing years, however, blood and serum transfusions were undertaken as a routine in all classes of warship, and members of the sick berth staff had acquired a degree of dexterity in manipulating transfusion equipment that was uncommonly encountered among medical officers at the outset of the war.

The naval problem was largely one of administration, and research was left to others better equipped to carry it out. The difficulties, which have been described more fully elsewhere (Ellis, 1946), were in some ways more complex than those facing the land forces or civilian services. A warship might be in action in the Arctic one week, and operating off Dakar a few days later. The resuscitation facilities deemed necessary for any ship's company had to be available, therefore, at all times. Medical units in ships were small and isolated, and the ship's medical officer acted as general practitioner, public health officer and emergency surgeon in quiet times, while in action he might be overwhelmed at times by a sudden influx of casualties. In action, the medical organization of a ship embraced the functions of first aid post, casualty clearing station and field ambulance. Whereas the Army might concentrate stores and trained transfusion teams in preparation for an advance, or behind a static front, or a network of civilian hospitals might work in close co-ordination, the small medical departments in warships were scattered all over the world and had to be self-contained and self-reliant.

The problems of supply, especially of a delicate commodity such as blood, were difficult, and the provision of specialized resuscitation teams was generally out of the question, except in hospital ships, which were frequently far away from the field of action and received casualties only after the acute phases of shock had passed. The method adopted, therefore, was to train and equip as many of the total medical force as possible. In practice this took longer to become effective than the organization ashore of specialized resuscitation units and was sometimes hindered by a tendency to conservatism in authoritative quarters.

Thus in the early years of the war naval experience of transfusion methods was acquired mainly in shore-based units, and the practice and organization for carrying out transfusions at sea was built up during the last three years of hostilities.

There is still much discussion as to what can be done and what should be done in ships, and many variables must be considered. For example, in the Mediterranean it was unusual for casualties to be retained in operational ships for more than two or three days, whereas in the Japanese campaign ships remained at sea far from their land bases for weeks on end and depended on the base ships of the Fleet Train. The sequence of events throughout the War will therefore be reviewed chronologically, and their significance to naval medicine in the future will be discussed.

THE GREAT WAR 1914–1918

In the Great War the experiences of the Naval Division in France and at Gallipoli, and of the Royal Marine Battalions ashore, were similar to those of the Army. It was appreciated that blood transfusion was the logical method of treating cases who had lost much blood, but in practice the difficulties were frequently prohibitive.

At sea, blood transfusion was considered to be quite out of the question, and reliance was placed on heavy dosage with morphine, warmth, early and efficient control of hæmorrhage, fluids by mouth, and the reduction of the transport of wounded to the minimum, while chloroform (now no longer in favour) was the anæsthetic of choice. The view held by many was expressed by a naval surgeon with four years' experience of war surgery: "If a patient does not improve with the application of warmth and stimulants, he will most certainly die."

Sea warfare was confined to the North Sea for much of the time, and, on an average, casualties from an action reached base hospitals within forty hours. First aid measures were frequently all that could be attempted on board ship. The retention of wounded in hospital ships varied from just under two days when carrying wounded from Dunkirk to Cherbourg after the first Battle of Ypres, to three or four weeks when carrying others from the Gallipoli beaches to England.

The small numbers suffering with shock in large batches of wounded admitted to hospital ships at Gallipoli were the subject of comment in the official history—a finding attributed to the time lag before evacuation from the battlefield after wounding.

1918–1939

Emergencies requiring blood transfusion are not common events in warships in peacetime, and there was little change during the next seventeen or eighteen years in the accepted theories from those on which the practices of 1918 were based.

However, the Abyssinian and Munich Crises and the experience gained in the Spanish Civil War caused a revision of ideas in certain quarters, and many of the larger ships were equipped with two or three "funnel and tube" transfusion sets, while others possessed patent devices such as the Stonvac and Vacoliter, but medical and sick berth staff were largely unfamiliar with the technique of transfusion. Policy was greatly influenced by those with experience and waning memories of the 1914–1918 war, and in September 1939 it could not be said that the main naval policy had altered very much since 1918.

1939–1940

The Admiralty instructions "Treatment of Surgical Casualties after a Naval Action" (1940) stated: "The medical officer may deem it necessary to employ intravenous infusion. The use of saline may be valuable as a temporary measure . . ." but replacement therapy was attempted rarely in the actions which occurred at this time.

No transfusions were reported during or after the Battle of the River Plate on 13th December, 1939, when 57 men were killed and 82 were wounded in H.M.S. *Exeter* in the first thirty minutes, including 18 who were badly burnt through not wearing anti-flash gear. Blood transfusion was not practised during the first and second Battles of Narvik, even in H.M.S. *Warspite* which acted as a clearing station in the second battle for casualties from the destroyers and received 59 cases. Under the chaotic conditions prevailing during the evacuation of Dunkirk—Operation DYNAMO—which commenced on 24th May, 1940, and later, after Italy entered the war in July, when H.M.S. *Gloucester* was bombed off Calabria, no reference can be found to transfusion being carried out in ships.

The main activity at sea spread to the Mediterranean in the autumn and resuscitation organizations with blood and plasma banks were established in H.M. Hospital Ship *Maine* and at the 64th General Hospital, the joint services hospital at Alexandria. Inter-Service co-operation was excellent on this station, and the Navy, both ashore and afloat, owed much to the advice and assistance of Major G. A. H. Buttle, R.A.M.C., the officer commanding the Army Blood Transfusion Service in the Middle East.

In default of supplies of more reliable blood products both these blood banks stored unfiltered plasma, decanted from blood with maximum precautions to ensure sterility, and this was used with considerable success in the treatment of cases of severe burns after several fleet actions (Wolfe and Clegg, 1942; Ellis, 1942). The *Maine* even supplied some of the cruisers with this unfiltered plasma, which was stored in the frozen state until required, and was used with success. Thus the adoption of practices which in normal times would have been beyond the pale was justified by the results achieved.

Burns accounted for numerous casualties at sea. Following the bombing of an Army transport in June, 14 cases of burns, due to the flash of explosions in the confined spaces below decks, were admitted to the Royal Naval Hospital at Plymouth, and 8 further cases, none of whom was wearing anti-flash gear, were admitted in November from H.M.S. *Javelin*. These early lessons of casualty reception organization stood this hospital in good stead later during the heavy air raids on this town.

1941

The experiences of aerial bombing in England during the first two years of the war, and to a less extent of the British Expeditionary Force in France (Maycock, 1940), demonstrated clearly the importance and general practicability of adequate and efficient replacement therapy. Plasma and serum in both wet and dry forms had passed the experimental stages and were being produced in comparatively small quantities in the United Kingdom and abroad for the Army and the Emergency Medical Services. The latter also supplied most of the naval requirements, and naval blood collecting teams were attached to regional blood banks in London and Leeds.

Certain facts were becoming apparent. Dry or wet plasma and serum were efficient and safe blood products and would keep for considerable periods without very special precautions. Blood transfusion equipment had been simplified and standardized. Burns were an outstanding cause of naval casualties. The majority of ships carried small supplies of dry or wet plasma or serum and a number of sterilized made-up giving sets. Panels of blood donors had been organized in many ships, but the medical staffs had been at sea since the outbreak of war with few opportunities for obtaining the practice necessary to familiarize operators with even the most simple transfusion equipment. Reports of transfusion at sea were still the exception rather than the rule.

On 10th January, H.M.S. *Illustrious* was hit off Malta by a total weight of 7,000 pounds of bombs and suffered many casualties. The medical staff were overwhelmed and no blood transfusions were given. No transfusions were reported during the evacuation of Greece and Crete or after the Battle of Cape Matapan. After H.M. Ships *Repulse* and *Prince of Wales* were sunk towards the end of the year it was reported that there was no time to transfuse casualties during the eight hour passage by destroyers to Singapore.

Accounts were heard occasionally of difficulties in using the various types of transfusion equipment available, and complaints were made about blunt needles which made venepuncture awkward or impossible. The conservative school of thought still considered transfusion afloat impracticable, and indeed with some of the equipment available in ships this was only too true.

By this time resuscitation organizations ashore were established in naval hospitals in areas where there was much enemy activity. Shepherd (1941) has described the experiences in treating air raid victims at Plymouth.

The resuscitation unit at Alexandria had been enlarged by the recruitment of members of the Friends' Ambulance Unit, who had lost their ambulances in Crete, and by V.A.D.s from the local British community, and a store of frozen unfiltered plasma was accumulating in cabinets in one of the meat refrigerators of the Royal Army Service Corps. This store was eventually used entirely during the Battle of El Alamein with satisfactory results, and its use was said to be unaccompanied by serious abnormal reactions. Although the possibility that infective hepatitis may have been transmitted in this way, to become manifest weeks or months later is a consideration which cannot be disregarded; the immediately toxic properties of these unfiltered products were apparently of a surprisingly low order.

1942

With the entry into the war of the United States of America and Japan, it is significant to note that one of the first serious attempts to transfuse casualties afloat was reported when H.M.A.S. *Canberra*, operating with Task Force 44 south of Savu Island in the Pacific, sustained 200 casualties in the first five minutes of an action. Casualties were transfused with American dried plasma in U.S. Ships *Barnett* and *Patterson*, seven patients being infused within an hour of their reception in the *Patterson*, although more could have been treated if supplies had been greater.

In home waters at this time the main activities consisted of actions in the English Channel involving coastal convoys on either side, and raids by Commandos. On 29th March, after the raid on St. Nazaire, 31 casualties were admitted to the Royal Naval Hospital, Plymouth. Two of the more seriously injured were transfused with fresh blood and recovered.

Following the raid on Dieppe on 19th August, 261 casualties—an unexpectedly large number—were admitted ten to twenty hours after wounding to the Royal Naval Hospital, Haslar, through a dislocation of the arrangements elsewhere. 19, who arrived dead, had died in transit. The seriously wounded numbered 169, and 30 were still on the "dangerous case list" four days later. Very few transfusions were given, only 16 bottles of blood being used in the first fifteen hours, but only 4 cases died in the ten days following admission, and 3 of these were almost moribund when admitted and died very quickly. This incident showed that, although none will gainsay the value of blood transfusion, the unaided recuperative powers of young and healthy men are still very considerable without it, if they can successfully surmount the first phases of "shock".

The Royal Naval Blood Transfusion Service was established in London in February, 1942, and from the outset directed its activities towards supplying the Fleets with serum and saline solutions and apparatus for administering them.

1943

During 1941 and 1942 many medical officers who joined the Navy had already become expert in the technique of transfusion as senior students or housemen at hospitals in the large towns during heavy air raids. Many nursing sisters and V.A.D.s with practical air raid experience were joining the naval nursing services and those already in the Service were familiar by that time with many of the problems.

Towards the end of the year the Royal Naval Blood Transfusion Service Unit boxes of transfusion equipment were issued to the Fleets. Each of these boxes contained all the necessary apparatus for collecting two bottles of blood from a blood donor and transfusing it to a patient; for infusing five bottles of reconstituted dried human serum, and for ascertaining the blood groups of donors and recipients.

In the first place they were issued on a scale which ranged from five boxes for a fleet aircraft carrier down to one or two for destroyers or smaller ships, but the supplies of blood products were augmented by further issues later. The outfit was complete in detail and even included a centrifuge attachment for performing cross agglutination which could be operated on the ordinary ship's table or bracket fan when the fanhead was removed. The only items which were perishable, apart from rubber tubing, were the dried serum and grouping serum, and the practical life of these was thought to be more than sufficient to meet the probable wartime requirements.

Thus ships were now equipped with standardized equipment which enabled the sick bay staffs to group and cross group donors and recipients, to collect blood from donors with a minimum of delay and to transfuse patients with blood, serum or plasma. It can be said therefore that from this time onwards blood transfusion was a normal procedure of naval medical practice afloat.

An important question to be decided was the scale on which these boxes should be issued. An early figure considered was one bottle of plasma or serum for every 20 men of a ship's company. Army experience in the Middle East and North Africa had shown that the average transfusion required 3 bottles of blood or blood product (average per case 1½ bottles of plasma and ½ bottle of blood) and that 10 per cent. of wounded normally required transfusion (30 bottles per 100 anticipated casualties), but in special circumstances with mine casualties or at advanced surgical centres allowance was made for the transfusion of 20 per cent. of casualties (60 bottles per 100 anticipated casualties). It appeared probable that the types of casualties which occurred in warfare at sea would frequently require the latter scale. The first issue therefore, according to Army experience, provided sufficient protein fluid for one average transfusion for every 75 men of a ship's company without allowing for wastage. This allowance was on the low side, but in view of the restricted supply situation the choice at the time lay between providing the total force afloat with some equipment or selecting certain units for preferential treatment. The former course was chosen for the reasons discussed earlier.

Reports on the success of these therapeutic aids in treating shock afloat were soon forthcoming. H.M.S. *Pozarica* was machine gunned and torpedoed by an aircraft on 29th January, when 20 men were killed and 18 injured out of a ship's company of 300. The dried serum was found to be very effective where used and undoubtedly saved the life of one man (given four pints). In April two casualties were transfused in H.M.S. *Paladin* when H.M.S. *Pakenham* was damaged by enemy gunfire and it was necessary in one case to expose the vein and insert a cannula. The predominance of burns among the injured was noted again, and the value was emphasized of portable electric headlights for medical parties after the light failed. H.M.S. *Leander* torpedoed off Kolo Bangara in the Solomon Islands on 13th July sustained 35 killed and 22 other casualties. Twenty units of American dried plasma were used in the treatment of these casualties and were said to have saved the lives of two of them only one man died on board. Two out of nine casualties from H.M.S. *Rockwood* hit by a glider bomb in the Mediterranean were transfused with very good effect in H.M.S. *Belvoir* and further successful transfusions were accomplished in this ship later when evacuating cases from Leros to Alexandria.

When H.M.S. *Cleopatra* was torpedoed on 16th July the use of anti-flash gear had been strictly enforced and the life-saving effect of the protection thus afforded was generally appreciated. Several cases were transfused with dried serum with satisfactory results.

After H.M.S. *Warspite* was bombed on 16th September 12 men were badly burnt and were treated with serum infusions. Again the need for full protective clothing even during the hot Mediterranean summer was strongly supported by the medical officer and the commanding officer.

During the operation in [illegible] on 17th October 17 casualties were received from an assault landing craft on board H.M.S. *Royal Scotsman* and 4 cases out of whom died were transfused with 10 pints of serum and 2 pints of blood.

On 26th December H.M.S. *Norfolk* was hit twice in action with the battle-cruiser *Scharnhorst* when covering a northern convoy and sustained 52 casualties. 44 cases were dealt with in the twenty-six hour period which elapsed between the damage and arrival in harbour. 15 sustained second degree burns and 3 first degree burns. 12 pints of serum were given to 4 of the 22 serious cases with striking results in one case although 2 others died. Once again preventable injuries occurred because men were not wearing their anti-flash gear. The 12 bottles of plasma available were inadequate for the number of cases to be treated and it was recommended that a minimum of 36 bottles should be made available on future occasions. In point of fact according to the scales of supply adopted for many ships in the Pacific war 200 bottles is probably nearer the mark for a cruiser on detached service if provision is to be made to cover all possible eventualities.

The assistance afforded by sick berth attendants who were trained in recording blood pressures and manipulating transfusion equipment was stated to be an important factor in the smooth working of the resuscitation party in H.M.S. *Norfolk*. The giving sets worked excellently. Once again the lights failed and electric headlamps proved invaluable.

Transfusion methods.—The technique of transfusion was in the meanwhile developing along fairly standardized lines. The importance of securing accurate replenishment of the lost circulating blood volume and the dangers of both under- and over-dosage led to replacement of "hit and miss" guesses in calculating patients' requirements for protein fluids by systematic methods for evaluating the clinical findings. The Army School of Blood Transfusion at Bristol (Kekwick *et al.* 1941) were among the first to indicate how this could be done and insisted on assessing the patient's condition as a whole rather than by placing undue emphasis on any particular sign or symptom. They placed greater reliance on measurements of the blood pressure than of pulse rate and found simple hæmatological investigations useful for checking their clinical impressions.

Formulæ were devised to assess the probable plasma deficiency in burnt patients. Black (1940) made use of the following relationship which was based on the simple estimation of the blood hæmoglobin percentage (Haldane) and the assumption that the average normal circulating blood volume was five litres, thus:

$$\frac{\text{Hb } 2}{\text{Hb } 1} = \frac{5}{5 - x}$$

where "Hb 1" and "Hb 2" were the hæmoglobin percentages estimated before the patient received the burn (assessed at 100 per cent. Haldane or 14 gm. per 100 c.c. of blood) and observed after he had received the burn, and "x" represented the plasma deficiency in litres. In the Navy this formula was put to valuable use by Welfe and Clegg (1942) and its value was proved repeatedly by the latter (unpublished communication, 1947) in treating casualties in the naval hospitals at Chatham and Haslar, where the following table was used for rapid working in the wards:—

PLASMA DEFICIENCY ESTIMATED BY BLACK'S FORMULA

Percentage of Hb	*Blood volume (litres)*	*Plasma volume (litres)*	*Estimated deficit in plasma volume (c.c.)*
100	5.0	3.0	—
105	4.75	2.75	250
110	4.55	2.55	450
115	4.35	2.35	650
120	4.15	2.15	850
125	4.0	2.0	1000
130	3.85	1.85	1150
135	3.7	1.7	1300
140	3.55	1.55	1450
145	3.45	1.45	1550
150	3.35	1.35	1650

Hospital ships.—During this time nearly all the naval hospital ships were employed for carrying wounded rather than as front line hospitals. This was the most common role of hospital ships throughout the war. The general practice was to carry a good store of dried serum and giving sets and to build up banks of freshly drawn blood from the donors on board or from the crews of ships in company whenever many surgical cases were expected.

Naval hospitals.—The naval hospital at Plymouth was probably the home hospital which was most actively engaged in dealing with the acute casualties. An analysis of 101 "recent" war casualties received at this hospital indicated the nature of the most common wounding agents: 46 per cent. of the casualties were due to torpedo attack, 32 per cent. were due to shelling, 10 per cent. were caused in aerial combat and 8 per cent. were the result of local air raids.

A clear-cut incident which occurred at the naval hospital at Haslar (Ellis, 1946) showed that however good facilities may be it will rarely be a simple matter to save severely shocked and wounded men, and directed attention to unidentified lung injuries and defective kidney function as additional hazards which swell the list of fatalities from aerial bombing. On the night of 6th June a naval training establishment was hit by a single bomb from an aircraft. 34 men were killed outright and [illegible] casualties were admitted within two to four hours of being wounded. The resuscitation facilities worked smoothly; there were ample stores of blood, and three trained resuscitation teams, and the staff appeared to be adequate for the emergency. Four of the wounded in particular were desperately ill with multiple large lacerated wounds, compound fractures and damage to the intestines, and were almost moribund when admitted. They responded remarkably well, however, to transfusion with an average of three bottles of blood each, before they received operative treatment four to five hours after injury. All four died. The first died on the operating table and was found later to have blast injuries of the lungs. The next died shortly after an essential amputation and was found to have an extensive contusion of one lung caused by a tiny fragment with a very small wound of entry. The third collapsed twelve hours after resection of 18 inches of intestine and at autopsy pulmonary oedema was found.

The last survived for three days with repeated transfusions following a hind quarter amputation and then died in uraemia, possibly due to the blocking of the renal tubules with blood pigment, sulphathiazole crystals or both, although it is hard to determine the extent to which this syndrome is purely mechanical or due to lowering of the vital function of the kidney in shock. The sooner the circulation is restored in cases of the latter type the less likelihood will there be of these intractable renal changes which may lead to such tragic disappointments after men with desperate wounds have made excellent initial recoveries.

These disappointing results, when compared with the relatively satisfactory results which followed the raid on Dieppe in the previous August, when blood transfusion was hardly practised, caused one to review the value of elaborate resuscitation schemes with some misgivings. In retrospect, however, it appears probable that the men who died as the result of the above incident would not have survived to return from Dieppe and would not, therefore, have been among the cases who were treated in hospital.

When the results of the two incidents are considered together it appears reasonable to conclude that, if young and healthy men are holding their own twelve to twenty hours after wounding, they have a good chance of survival even without replacement therapy if the effects of further operation or secondary haemorrhage and cases of burns are excluded. *Massive* transfusion at this stage is rarely required if the above eventualities are excluded, and should be undertaken only after careful assessment of the clinical state of the patient, including accurate recording of the blood pressure and fluid balance and, if possible, measurement of the erythrocyte count, haemoglobin percentage and blood urea. Certain of the effects of oligaemia may have been corrected by the patient's own compensatory mechanisms which control the distribution of the body fluids.

Undoubtedly the optimal time when transfusions are required is as soon as possible after wounding and the mortality even then will usually be high for the serious cases. Replacement of the blood which has been lost is only part of the

[illegible]

1944

The invasion of Europe.—The opening months of 1944 were fully occupied with preparations for the invasion of Europe and, in conjunction with the Army and the Emergency Medical Service, transfusion arrangements were made to supply the assault forces, most of whom were to be carried in a fleet of landing craft, and the coastal areas where counter attacks were to be expected and to which casualties were to be evacuated after the battle commenced.

After the North African campaign the weight of surgical opinion was in favour of the increased use of blood as opposed to serum or plasma for the correction of blood loss wherever possible. This apparently logical conclusion outweighed the additional administrative disadvantages of providing extra blood. It was intended that most of the wounded should be carried by specially equipped tank landing ships (L.S.T.s), largely staffed and equipped by the Royal Navy, which would carry tanks to France and return with wounded. Each of these L.S.T.s carried a surgeon, an anaesthetist and a resuscitation officer.

The great value of blood and plasma, the efficiency of the transfusion sets and the high standard of training of medical personnel stand out in the medical accounts of this great amphibious operation in contrast with the story of the early war years and suggest that in future dried plasma or serum will be the naval standby for resuscitation afloat.

A typical example of the medical experience gained in these landing craft is found in the story of H.M.L.S.T. 363. This craft carried 563 casualties from Normandy to England between 6th and 30th June, 1944. Details of the voyages were as follows:—

Voyage	*Cases*	*Operations*	*Time to embark casualties*
First	187	20	30 hours
Second	97	18	26 hours
Third	279	7	14 hours

There was no delay in disembarkation.

The demands for surgery fell with each voyage. 45 operations were carried out whilst on passage and only 3 cases, who were moribund on embarkation, died. Both whole blood and serum were available, being used in approximately equal quantities, and they were frequently life saving. The value of applying pressure by means of rubber bulbs to increase the transfusion rate was remarked upon.

H.M.S. *Belfast* received seven Army casualties on D Day (6th June) and three of them were transfused with nine pints of serum, although two of them died.

In S.S. *Cap Tourane* 173 casualties were received between 9th and 30th June; 5 died on board. 34 pints of dried serum were used and 4 pints of fresh blood were collected from donors in the ship's company. The transfusion sets worked excellently.

The naval hospitals.—The part played by naval hospitals is clearly described in the account by Hunot (1946) of the arrangements and experience at the Royal Naval Hospital Haslar. This hospital received many of the most severely injured cases who were unfit to travel farther inland, and 1 347 severely injured men were treated in just under three months following the landing in Normandy.

The important part played by transfusion in the resuscitation of casualties is shown by the figures for the first fortnight of the offensive between 7th and 21st June. During this time 576 bottles of blood and 436 bottles of reconstituted dried serum were used in the treatment of 150 out of a total of 586 casualties admitted (approximately 25 per cent.). The total deaths during this time amounted to 16, and only 10 of these were men who were transfused. Each case received on an average about two bottles of blood and two bottles of serum. 23 patients were transfused twice and 4 cases were transfused three times.

Group IV (O) blood was used on 98.5 per cent. of occasions. 20 per cent. of the blood was collected less than seven days before use, 70 per cent. between seven and fourteen days and 10 per cent. was over two weeks old. The observed incidence of reactions to transfusion was only two per cent., but may have been higher in fact.

In addition, 247 bottles of glucose saline were infused to patients, with an average of just under 4 bottles per case.

The examination of the types of wound sustained showed that the major injuries were wounds of the upper and lower extremities in 44 per cent. of cases, abdominal wounds in 19 per cent., chest wounds and burns each account for 11 per cent., and 6 per cent. had suffered head injuries. The average time lag between wounding and resuscitation in this hospital was about four days, so that on admission the initial phase of acute shock had generally passed. Most of the severe cases were probably survivors from the acute phases of shock and of course many of them had been transfused before admission. The very low mortality rate should be viewed with the knowledge that many acutely shocked men did not survive to reach hospital.

The successful resuscitation of this large group of severe casualties was achieved only as a result of considerable forethought and planning. Members of the naval Voluntary Aid Detachment and of the Sick Berth Staff had been trained in transfusion methods for over twelve months before the invasion started, and for three months prior to D Day they were instructed in the recording of blood pressures and in assessing the qualities of the pulse.

In staffing the wards it was accepted that, on the average, one nurse could look after only two severely injured patients and carry out her duties efficiently. Technicians skilled in making haematological examinations were attached to the resuscitation ward and carried out their investigations there. All members of the staff were in two watches. The keenness and team work shown by the nurses and sick berth staff, and the planning which had taken into account the numerous staff required for work of this kind, were well repaid by the high quality of the results achieved.

The Mediterranean.—From this time onward the [illegible] replacement therapy ashore and afloat, and the good dividends paid by [illegible] training in resuscitation methods, are shown again and again in the [illegible] reports from all theatres. Thus in October it was reported from H.M.H.S. [illegible] standing by at the liberation of Greece: "Six months' training of casualty resuscitation teams were fully justified, and one ward was reserved entirely as a resuscitation ward."

The value of a landing craft as a casualty clearing station and the importance of air co-operation was also demonstrated in this series of operations. H.M.L.C.I.(L) 273, a casualty clearing ship, was employed as a forward surgical unit at Zea in the Athens/Piraeus area from 2nd November, 1944 till 6th January, 1945. During the last three weeks of this period 101 casualties were treated. Bottled blood was flown from No. 5 Blood Transfusion Unit at Bari and also from Colombo, and numerous cases were transfused before evacuation, either to a hospital ship lying farther out or to a field hospital along the coast. The remarks of the commanding officer of the 183rd Field Ambulance testify to the value of this intermediate casualty clearing ship: "The arrival of L.C.I.(L) 273 was undoubtedly life saving. ... It would have been of great value at Salerno."

1945

The Pacific.—With the collapse of Germany attention turned to the Far East and the Pacific area, where the difficulties of blood storage and the mobile nature of the Fleet's activities caused reliance to be placed to a greater extent on dried serum and plasma, although fresh blood transfusions were carried out not infrequently.

In the first part of the year serum transfusions were performed in many ships including H.M. Ships *Meteor*, *Daffodil*, *Rapid*, *Redmill* and *Thane*.

When H.M.S. *Illustrious* was shelled in January the dried serum was reported to be a great success in the treatment of 38 casualties and the Principal Medical Officer remarked: "Time should not be wasted in surgical heroics, but vigorous and prolonged transfusion kept up so that, if the case survives and improves and the situation permits, deliberate operation may be undertaken."

In April two petrol vapour explosions in H.M.S. *Glenearn* killed 3 and burnt 58 men; 23 of them were critically ill and 16 injured, and 12 eventually died. 26 bottles of serum and 16 bottles of saline—the full supply—were used in treating them and much more would have been utilized had it been available.

The frequency of burns in actions and incidents at sea lead one to think that the scale of issue for serum should be double that allowed ashore where other types of wounds generally predominate; this would entail a supply of at least six bottles for every anticipated severe casualty.

On 4th May a Japanese "suicide bomber" (Kamikaze) hit H.M.S. *Formidable* after machine gunning the flight deck, causing 8 deaths and 47 wounded; on 9th May another Kamikaze plane hit the ship causing fewer casualties. In the treatment of these cases 250 bottles of serum were used (180 bottles in the first incident). It appeared that one bottle for ten men was an adequate allowance for only one severe action in the Pacific. Again the excellence of the British "giving set" was praised and the high dividends paid by careful first aid training of the ship's company were emphasized.

It was recommended in that area that one bottle of serum should be issued for every two ratings in a ship's company, and that concentration sets should be available for medical distributing stations. With such large requirements the need for replenishing ships' stock of transfusion fluids or even for providing complete resuscitation teams by means of organized air transport will require careful consideration in future warfare.

On 10th May a near miss killed 4 and severely injured 14 men in H.M.S. *Virago*. Three amputations of arms were carried out on board by two medical officers and 29 bottles of serum and 2 bottles of freshly drawn blood were administered.

On 17th May an aircraft returning to H.M.S. *Victorious* burst into flames on the flight deck causing five casualties; the two most severely injured each received five pints of serum but died in spite of this. Then on 18th May the ship was hit by two Kamikaze planes when there were 22 casualties, 3 of which were fatal. 12 men were badly burnt, many of them sustaining burns of the ankles because they were not wearing socks. The medical officer remarked "At last this ship is first aid minded" in view of the excellent bearing of the crew.

One of the final Kamikaze attacks on H.M.S. *Vestal* caused 42 casualties and on this occasion 7 pints of blood collected from donors on board and two bottles of serum were used in the resuscitation of the wounded.

PEACETIME POLICY

The wise pre-war planning which placed the responsibility for research and for the practical direction and administration of large-scale replacement therapy in the hands of eminent medical scientists has yielded a rich harvest of knowledge from the battlefields.

We know that when a man is suffering from oligaemic shock in a pure form we can alleviate this condition entirely by the infusion of blood or protein fluids, provided that he is treated early enough and that replacement is achieved with accuracy. Unfortunately it has become only too apparent that this uncomplicated clinical picture is the exception rather than the rule, and that various combinations of pathological processes must be considered in assessing the therapeutic measures necessary for the treatment of a battle casualty.

Cold and dehydration are well recognized complicating factors and their treatment is relatively simple. Great advances have been made in the prevention and treatment of wound infection, and highly efficient drugs and techniques for securing anaesthesia have been developed. So far so good, but we know less about the importance or mode of action of toxic cleavage products which may be absorbed into the circulation following the dissolution of tissue or blood. The rôle of neurogenic factors, upon which emphasis was placed in the 1914–1918 war, still requires careful consideration and merits further investigation. The limitations of the kidneys and lungs when subjected to unusual combinations of circumstances are not clearly defined and may be overlooked.

From the practical viewpoint of naval medicine, however, these various considerations shrink in significance when considered with the important facts so clearly demonstrated, that oligaemia due to blood loss and haemoconcentration due to burns can be treated without delay after injury in all ships by the infusion of either blood or blood products.

The great frequency of flash burns in naval actions, or for that matter whenever explosions of any type occur in the confined spaces of ships, points strongly to the need for continuing in peacetime the organization for carrying out replacement therapy both ashore and afloat on the lines which proved to be successful in the latter stages of the recent war.

While considerable modifications of the scale of operations will be desirable, certain desiderata for carrying on the work in peacetime can be laid down.

(1) The transfusion sets of equipment issued by the Royal Naval Blood Transfusion Service should remain as service afloat stores in all ships, and the medical and sick berth staff should be trained to be thoroughly familiar with the use of this standardized equipment.

(2) Additional stores of dried serum or plasma, saline for the reconstitution thereof, and giving sets should be carried in all ships of cruiser size and upwards and in smaller vessels when on detached service. The peacetime scale of allowance would require to be greatly increased when war was imminent, and the requirements might be very high. For example, it has been suggested that the allowance should be one bottle of protein fluid for every two members of the crew of a ship on detached service in the tropics in wartime. A compromise between such a lavish scale of issue and the practical possibilities would probably be enforced by the supply situation, but the suggestion is not unreasonable.

(3) Instruction in the practice of blood transfusion and the use of the standard Service equipment should be an integral part of all courses of instruction for naval medical, nursing and sick berth staff. The standardization of equipment and practice throughout the Service should be maintained.

(4) The undoubted merits of transfusion of fresh blood for treating oligaemic shock and cases of anaemia, and the value for training purposes of using the blood collecting sets as often as possible, point to the need for maintaining blood donor panels in hospitals, ships and naval establishments. Resort to the use of regional blood banks or plasma or serum transfusions should be necessary only when the urgency of the situation demands it.

(5) While the full time organization and manning of a resuscitation ward in a hospital may appear unjustifiable in peacetime, the lessons learnt in the bitter circumstances of war will be perpetuated only if small resuscitation wards, with perhaps only six to eight beds, are permanently and actively

maintained and staffed as part of the peacetime casualty reception organization of naval hospitals with trained resuscitation teams on call for emergencies. While the practical value of such an organization is obvious the value for training purposes to all concerned cannot be overstated in a service of which the main function is to be prepared for war When advances in the technique of replacement therapy are evolved or as new hazards of war become probable the practice of the naval resuscitation teams will require revision Finally a well-equipped resuscitation ward offers excellent facilities for further detailed clinical study of wound shock under the less harassed conditions of peacetime

(6) The scope of the transfusion and resuscitation unit could be extended if necessary to include all forms of intravenous therapy such as glucose saline or penicillin administration and the infusion of protein hydrolysates or other forms of therapy which involve the introduction of fluid to the blood stream at a controlled rate

Although skill in transfusion methods is now the attribute of all medical and nursing staff the most efficient treatment of patients and the smooth co-ordination of the many interests involved in any hospital will be achieved only if the principle of centralizing this specialty and vesting authority in specially designated persons—which in war proved to be essential for success—is perpetuated in a modified form in the years of peace Progress will then be made and if further emergencies arise it may not be necessary "next time" to pick up the threads where they were dropped at the end of the previous war

ACKNOWLEDGMENTS

In the preparation of this brief chapter of naval medical history I would like to acknowledge the kind advice of Sir Lionel Whitby Dr H W Clegg and Surgeon Captain S G Rainsford Royal Navy who have read and criticized the subject matter and who by their wise counsel and practices contributed so much to the wartime advances in the methods of treating "shock" in the Royal Navy

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MEDICAL ASPECTS OF A WARTIME ANTARCTIC EXPEDITION, 1944-1946
(OPERATION TABARIN)

BY

Surgeon Lieutenant E. H. BACK, R.N.V.R.

This is a report on the health of a party of men who spent two years in the Antarctic.

The expedition left the United Kingdom in December 1943 in the troopship *Highland Monarch*, arriving at Port Stanley, Falkland Islands, at the end of January 1944. Two bases were established—the main base with nine men at Port Lockroy off the west coast of Graham Land in latitude 64° 50' S., longitude 63° 30' W., and a smaller one at Deception Island in the South Shetlands in latitude 62° 59' S., longitude 60° 30' W. In February 1945 the leader, Lieutenant Commander J. W. S. Marr, resigned and was succeeded by Captain A. Taylor. One other man returned to Stanley and nine fresh men came out. For the second season the main base was shifted to Hope Bay on the north eastern tip of the Graham Land peninsula in latitude 63° 24' S., longitude 56° 59' W., being manned by 13 men; the bases at Port Lockroy and Deception Island were maintained by 4 men each. With the exception of the two men who came south in the 1944–1945 season and who remained for a second year, all men were relieved in January 1946. The men were mainly scientists, some being in the Royal Navy, some Army and some civilian. For the first season ages ranged from 20 to 49 with a mean of 34, and for the second season from 21 to 47 with a mean of 34.

The base at Deception Island was established in the buildings of the derelict whaling station, the other bases being built of wood by the expedition members. Walls and roof were double with a four inch air space in which were layers of aluminium foil and sisalkraft paper. The houses were snowed up in winter but were always warm; they were heated by slow combustion coal stoves. The ships which brought the stores left as soon as they were landed. Bases were in regular W/T communication with each other and with Stanley. Mail was received in April and December 1944 and in February 1945. Work done at the bases included meteorology, botany, geology, biology, tidal observations and surveying; in addition two sledging journeys, of five and seven weeks' duration, were made by dog team from Hope Bay.

The medical officer was stationed at the main base, advice being sent by radio to the other bases when required. Typewritten sheets of instruction on the questioning and examination of patients were left at the small bases; hence the first report on a sick man usually contained enough information for diagnosis. During the summer several patients from visiting ships were treated; they are not included in this report.

MEDICAL EQUIPMENT

The expedition was organized in great haste and secrecy in London in the autumn of 1943. As a result of this haste and my own inexperience far too many stores were ordered, and what was meant to be two years' supplies would probably have lasted for ten.

At the base most of the medical equipment, including all stores which were liable to be damaged by frost, were kept on a set of shelves in the house. Surplus stores were kept in packing cases with other stores in a Nissen hut apart from the main house; thus an ample supply of medical stores would be available in case of fire. On a shelf in the messroom was a bottle of flavine solution, cotton wool, adhesive tape and scissors, so that anyone sustaining a minor cut could clean it and apply plaster, and even in the days when there was no house these articles were available for all. Vitamin tablets were distributed daily at supper, each man taking 50 mg. ascorbic acid. It was found that the pills supplied in 1944 were far superior to those supplied in 1943, the latter often being brown, indicating deterioration. For short periods during the winter of 1945–1946 compound tablets of vitamins B and C were used, but the B was probably unnecessary. All other stores were under the care of the medical officer and were issued only by him or his deputy when he was absent from the base.

The original medical stores were despatched in 13 cases from Chatham Dockyard in October 1943. The packing was excellent, so that, in spite of the rough handling received during the voyage to the Antarctic, which involved manhandling on at least ten occasions, not one article was damaged.

Food

Food was almost entirely canned or dried. Details of the total food used at Port Lockroy in 1944 were contained in the interim report of December 1944; owing to the suddenness of the party's relief in 1946 no such tally is available for the second year. There was plenty to eat but the diet tended to become monotonous, and in this latter aspect the importance of having a good cook cannot be over-emphasised. The main base was fortunate in having a master baker as cook in the person of Mr. A. T. Berry, who had been chief steward of the *Discovery II* for many years. His excellent meals went far towards maintaining morale, and none of the party would have forgone them willingly.

Fresh food was scarce. During the winter of 1944 the only fresh meat was an occasional dish of shag or seal; about a month's supply of fresh mutton and vegetables arrived in December 1944; all the fresh meat sent in February 1945 went bad. During the second year fish was plentiful from June to September, being served at least once a day, and more seal was eaten than in the previous year though in both years this was scarce. Large numbers of penguin eggs were eaten in November and December.

Palatability of the local food varied considerably. The fish of genus Notothenia caught in winter through holes in the ice was excellent. Penguin eggs, especially the Adelie, are very good eating and were enjoyed by all. Seal liver was good, particularly crabeater, but not comparable to good ox liver. Crabeater seal steak was good, while opinions differed on the subject of Weddell steak, some liking it and others considering that it was tough and tasted of blubber. Shag was good; penguin breast was not as nice as shag but still quite palatable.

Owing to the daily issue of ascorbic acid there was never any sign of scurvy or sub-scurvy due to the absence of fresh food. Nevertheless a very real craving for fresh food developed towards the end of the winter, its arrival in December 1944 being second only in importance to the mail. It is to be regretted that on the voyage to the Antarctic fresh vegetables tend to be regarded as "just a sack of potatoes" and consequently arrive very much the worse for wear. If carefully transported, meat, vegetables, eggs and fruit will keep for at least a month, onions lasting up to four months; dried and tinned foods, however well cooked, tend to be less appetising than fresh.

The tinned and dried foodstuffs were good on the whole. Some strange freak of economy required that tinned meat should be shipped from the River Plate to the United Kingdom and then back to Montevideo prior to being sent to the Falklands, so that the meat was one to two years old on receipt and much was unfit for consumption by January 1946. Bacon sides were placed in soldered tins without salt, and none was edible, having gone bad in the tropics.

SANITATION

The sanitary arrangements at Port Lockroy were described in the 1944 report. At Hope Bay the lavatory was at the end of an extension built out from the back side of the house. A urinal made out of flattened corrugated iron occupied one corner with a pipe running through the floor. This pipe froze in mid-winter, requiring excavation from outside and the use of a red-hot poker. A three-holer occupied the rest of the space with a can of corrugated iron underneath, which could be withdrawn through a hinged flap to the exterior. Ashes placed in the bottom of the can caused the frozen mass to separate easily, and lysol solution was poured down when the can had been emptied each week. Owing to the prevalent low temperatures the lavatory never became offensive.

GENERAL HEALTH

The general health of the party was good with the exception of two men who were medically unfit to be sent to the Antarctic. A full medical examination of all men at Port Lockroy was performed in January 1945. No sign of any serious disease was detected; all the men felt well, the majority saying that they had been more fit than they would have been at home. As no warning was given of the date of relief no similar examination was possible in 1946, but all at Hope Bay appeared healthy.

The following are the main points noticed during the two years:—

Respiratory infections.—During the first month after arrival at Port Lockroy in 1944 there were three cases of acute pharyngitis with pyrexia, general malaise, aches and pains. Thereafter there was no case of respiratory infection among the shore personnel, although there were many cases on board the relief ships in the 1944–1945 season. One man developed a severe quinsy immediately after his return to Stanley in 1946.

Bowels.—The regular hours of work and meals were a good influence on bowel action as is shown by the fact that only three purgative pills were dispensed in two years. Men who had been in the habit of taking laxatives regularly at home found that they could dispense with them. All agreed that there had been an improvement in bowel habit. Sporadic cases of diarrhoea occurred; no cause was apparent and all cleared with twenty-four hours' starvation.

Deficiency diseases.—The only case suggestive of a deficiency disease was one of recurrent small superficial ulcers of the mouth and lips. It failed to respond to massive doses of vitamins so the ætiology remains uncertain. The only supplement necessary at the base was 50 mg. ascorbic acid; on sledge journeys the daily ration was three compound vitamin tablets (75 mg. of C plus B complex) and one adexolin tablet.

Frostbite.—All members of the winter sledge party sustained frostbite of the feet, but in only one man was this more than superficial blistering. This man went out in wet boots to tie up dogs in a temperature of − 30° F. He developed extensive necrosis of the right hallux though the bone was not involved. Healing was very slow, but was complete in five months, the slough taking two and a half months to separate, though the toe was definitely shorter than before.

Snow blindness.—One classical case occurred in November 1944. Use of snow goggles from September to March was an effective safeguard.

Injuries.—Small cuts and abrasions were frequent during building operations. In 1944 several cuts became infected and one felon required incision under local anæsthesia. No sepsis occurred after March 1944. All cuts and cracks were covered with adhesive tape which was applied direct after preliminary cleaning with flavine solution 1:1000. This treatment was found to be superior to any other and most cuts were healed in four days.

Four men sustained sprains mainly due to skiing falls. They were treated by elastoplast strapping for three to four weeks and all did well. One man fractured the head of the first metacarpal joint while skiing; a lump was still present after eighteen months but function was good. A case of fractured metatarsals was treated by six weeks in plaster with a home-made walking iron with an excellent result. Two men at Deception Island fell 300 feet down a hillside in May 1944, sustaining fairly extensive soft tissue injuries which healed satisfactorily. While lifting heavy stores at Hope Bay in February, 1945, one man sustained an injury to his back so that he could not walk. Diagnosis rested between a torn muscle and an avulsed lumbar transverse process. Recovery was complete in three months and he went sledging after six months, though he felt that his back was not as good as it had been. A radiograph in England should determine the diagnosis.

Miscellaneous.—One man who had had recurrent attacks of lumbago for ten years had attacks necessitating rest in bed for three days in August, 1944, and June, 1945. No cause was apparent. He went on all sledge journeys without feeling any pain.

There was one case of tinnitus which persisted for nearly two years and was still present in January 1946 No cause was found [illegible] change with the passage of time

One man at Deception Island was incapacitated for [illegible] in June 1944 with pain in the back and testis and frequency of micturition He had a history of a previous similar attack in April 1943 On his relief in December 1944 a letter was sent to the Senior Medical Officer Stanley recommending a full urinary investigation This was considered unnecessary by the S M O

Dental —Dental health was remarkably good The only work done during the first year was the replacement of old fillings which fell out Three holes required filling with zinc oxide and clove oil these temporary fillings lasting up to six months before having to be repeated Captain J Tomlinson of the Army Dental Corps visited both bases in December 1944 and sent in a report to the Army authorities he particularly remarked on the total absence of caries

During the second year a similar freedom from trouble was noticed With the exception of one case the only treatment required was the filling of two holes in the case referred to the teeth were full of fillings which were constantly falling out He was the only man who suffered from toothache and this was relieved by the temporary fillings There did not appear to be any reason for his dental trouble and he was otherwise in good health Various details of his dental treatment occupy almost half of the 1945 medical log

Unfortunately Captain Tomlinson was on leave when the expedition returned to Stanley so no full dental examination was possible All men were advised to visit the dental surgeon on return to the United Kingdom Captain Tomlinson saw the above-mentioned case in Stanley in March 1946 and repaired all holes and again remarked on the absence of caries This absence of caries seems significant and will probably justify further research

Psychological —There was so much work to be done that for most of the period there was little time for worry For relaxation there was a good library a gramophone with records to suit all tastes and various indoor games Many men had hobbies News from the B B C was heard once or twice daily and there was a local broadcast from Stanley on Sundays from June 1945 The main cause for anxiety was the lack of information about future plans Towards the end of the second year when no news of relief had been received, the anxiety felt by many men was severe The strain was felt more by the men at the Base than by the sledging party who were fully occupied with their work.

Conclusion

Taking all factors into consideration it is apparent that two years is the maximum that any man should spend in the Antarctic at one time

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D.D.T. IN S.E A C.

BY

Surgeon Commander D. H BIRT, R N

A RECENT article (Mockler 1947) gave an account of the development in Australia of the technique of disseminating D D T from aircraft A great deal of work in this direction was done by British workers in other theatres mainly South East Asia and the Middle East, and the following is a brief account of the work done in the former.

Although the control of malaria in India had been attempted before the war by Covell and Afridi, using a light aeroplane to spread Paris green, it was the success of the *Piper Cub* experiments at Orlando, Florida, which focused attention on the potentialities of D.D.T. spread by this method. Thus, from December, 1943, the Supreme Commander's medical advisers were determined that D.D.T. airspray was an operation requirement that must be perfected for use in the forward areas.

Many angles had to be considered: availability of suitable aircraft, supply of D.D.T., suitable dispersing apparatus, optimum droplet size and pattern, effect on insect life, effect on crops, Japanese reaction to what would appear to be chemical warfare, and so on. It was decided that *Hurricane* aircraft using the British S.C.I. tanks or the American M.10 (both chemical warfare apparatus) should be used for the first trials, which were carried out at Palam, near Delhi, in the spring of 1944, by the usual method of cards placed over the airfield. From these trials an altitude/airspeed formula was worked out by scientists to give the maximum swath for the optimum droplet pattern.

In the meantime the Supreme Commander despatched two of his medical advisers to the United Kingdom and the United States of America to interview the Ministry of Supply and Munition Assignment Boards in an attempt to step up the production of D.D.T. The world supply in the spring of 1944 was of the order of 14 tons a month, whereas the estimated requirements for South East Asia alone for 1945 totalled 3,000 tons.

After the preliminary trials at Palam, a full scale trial with a squadron of *Hurricanes* fitted with S.C.I. tanks was carried out at Cuttack, in Orissa. This trial lasted over a month, and was supervised in the field by the naval Consultant in Malariology. A full report, containing a mass of meteorological, entomological and biological data, was prepared by the Medical Advisory Division, making this trial probably the most fully reported and carefully controlled airspray trial of the war.

Similar but less ambitious trials were later held at Jessore and other airfields.

In the autumn of 1944 S.E.A.C. lent an observer and sent a squadron of *Vengeance* aircraft to Takoradi to take part in an airspray trial sponsored by the Medical Research Council. This trial was not a success, owing partly to the lack of *Anopheles gambiae* and partly to the unsuitability of the *Vengeance* for this purpose owing to its lack of forward visibility.

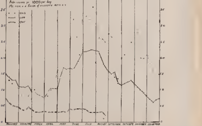
During 1944 the Americans of the C.B.I. Theatre carried out experiments in Assam with a belly tank in Mitchells (B.25), producing a mass of experimental data including very impressive three dimensional graphs of the droplet pattern.

We passed from the experimental to the operational stage with a variety of aircraft, including *Dakotas* carrying 600 gallons in barrels in the cargo space. By the time of the fall of Rangoon we had operational D.D.T. squadrons of *Liberators* carrying 1,300 gallons per aircraft sortie.

Although D.D.T. airspray played an important part in the control of malaria in South East Asia it would appear to have only a limited application to the control of malaria in peacetime Under wartime conditions such as in Burma where a passport to eternity from a land mine or booby trap was the reward for leaving the road or track it was of inestimable value but owing to its wide destruction of a host of susceptible insects it undoubtedly upsets the balance of nature in that locality Furthermore if kerosene is used as the solvent it burns the crops it falls on although this difficulty could be overcome with xylene or triolene water emulsion

Incidence of Malaria in South East Asia —It is well known that in all major campaigns for the past century and a half from Walcheren in 1809 onwards the ratio of disease to battle casualties was overwhelmingly in favour of disease with the single exception of the war in Europe 1914–1918 in which parity was approached Frederick of Prussia is quoted as saying Fever cost me as many men as seven battles and there seemed no reason to suppose that the projected campaigns in South East Asia would be any exception

The Army was by far the most numerically superior Service element in South East Asia Command and the following graph shows the incidence of malaria and fever of uncertain aetiology in the armies operating in South East Asia during 1943 1944 and 1945 up to the collapse of Japan



The full medical armament could not be brought to bear before the [illegible] [illegible], but the effect is striking. It is not intended to convey the impression that D.D.T. airspray alone was responsible for this, but it played its part along with increased anti-malarial discipline, suppressive mepacrine, long trousers, dimethylphthalate and successful work by field hygiene sections along the lines of communication.

The strength of the Allied Land Forces in South East Asia for 1945 is not available, but it was increasing and may be taken at around 600,000. A comparison in the peak transmission season (July) shows that in 1943 the actual admissions for malaria and fever of uncertain aetiology were 1,873 per day, whereas in 1945 it was only 180 per day. In other words, the peak admissions in 1943 meant that a whole battleship complement went sick every day with fever, whereas by 1945 it was only a destroyer's complement.

Dudley has said that the curse of preventive medicine is that its power is apparent only when it fails. From the figures given here it is possible to estimate the extent of the original failure from the extent of the later success.

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THE MEASUREMENT OF THE THERMAL ENVIRONMENT AFLOAT

BY

Surgeon Commander J. MANSEL REESE, R.N.

WHEN considering the question of providing adequate ventilation afloat, the purpose for which a warship has been constructed must always be borne in mind, and also that the object to be attained should be the provision of the best possible ventilation *compatible with the ship retaining the highest degree of efficiency as a fighting unit*. Perhaps the more important points which may be stressed in this connexion are that the additional weight and the space occupied by the ventilation system must replace to a greater or lesser degree that required for more warlike equipment, and that the necessity for dividing a ship into a large number of watertight compartments increases enormously the difficulty of providing a satisfactory ventilation system. Another factor of great importance is the mobility of a warship and the possibility of severe changes of temperature at short intervals.

In the Second World War, living accommodation in H.M. ships was being encroached upon continually by the addition of extra armament and machinery, which, together with the resulting additions in complement, exerted an increasingly bad effect upon the atmospheric conditions on board. The necessity for maintaining strict "black-out" conditions was an additional source of discomfort to crews. There was no doubt that the ventilation arrangements in most ships during the War, especially when they were serving in the tropics, left much room for improvement.

It is now generally agreed that those symptoms such as headache lassitude and inability to concentrate which are so noticeable after a period spent in a hot and crowded compartment, and which were formerly considered to result from chemical changes in the air, are really due to its *physical* qualities. There was a time when attention was paid almost exclusively to the chemical constitution of the air in badly ventilated compartments and the degree to which the carbon dioxide content was increased and the oxygen diminished. However, when it was shown that the percentage of carbon dioxide in the atmosphere could be raised very considerably from the normal without harmful effects and that the quantity of oxygen could be much reduced without necessarily precipitating symptoms of ill health, attention was transferred from the chemical to the physical qualities of vitiated air.

The maintenance of a constant temperature in man is dependent upon his ability to balance excessive heat production by a corresponding increase in heat loss. In normal circumstances the body loses heat by radiation, convection and evaporation, and its physiological heat-regulating mechanism is capable of maintaining a constant temperature in widely varying thermal environments. Thus, in warm atmospheres there is a dilatation of surface blood vessels and an increased supply of blood to the skin. In this way the surface temperature is raised and heat is lost by radiation and convection; heat may also be lost by way of the lungs and through the evaporation of sweat from the skin.

In overcrowded and badly ventilated compartments, especially in warm climates, the temperature of the air rises gradually and its moisture content is increased. As conditions become worse the body is less able to maintain its normal temperature by means of radiation, convection and evaporation, and as the atmosphere becomes more and more laden with moisture so does the evaporation of sweat become increasingly more difficult. The occupants become gradually more lethargic and disinclined for work and will continue to do so unless the temperature of their surroundings and the degree of humidity are adjusted.

The temperature and humidity of the atmosphere are not the only factors of importance to be considered when dealing with the conditions in living spaces, for the degree of air movement also has an effect upon the cooling power of air, since by removing the layer of warm moist air next to the body it aids the evaporation of sweat. It is then the *combination* of all these factors—the temperature, the humidity and the degree of air movement—which will produce a good or a bad atmosphere and a correspondingly good or adverse effect on a man's health and efficiency.

Although the sensation of stuffiness and general unpleasantness in a badly ventilated compartment is usually quite evident to normal persons, it is necessary to possess means for providing accurate measurements with which to compare the adequacy or otherwise of ventilation in ships under varying conditions and which can be referred to by naval constructors when considering future construction.

The term "habitability" is now used when discussing the living conditions on board ship from the point of view of the combined effects of temperature humidity and air movement. Each of these factors has [illegible] upon health, but as they are always present together they must be considered together when appraising the total effect any particular atmosphere may have upon men. For example, two compartments may possess the same temperature and yet may exert an entirely different effect upon their occupants if the degree of air movement or the amount of moisture in the air is not the same. Some method is necessary, therefore, for measuring the *combined* effect exerted by all these factors.

This combined effect is measured by estimating what is known as the *effective temperature*, and is calculated from tables based upon the temperature of the air, its humidity and the degree of air movement. It is therefore an index of the total effect exerted by these various factors.

In recent years measurements have been made in H.M. ships of the thermal environments in which men have had to live and work. These measurements were carried out by members of the Royal Naval Personnel Research Committee who visited ships on both home and foreign stations and under conditions of both war and peace. Experiments have also been carried out ashore to measure the loss in efficiency when men performed, under varying thermal conditions, work which they would normally have to perform on board in comparable atmospheres. The object of all these investigations has been to define the upper desirable limit of effective temperature, above which there is a definite decrease in a man's efficiency when engaged upon his normal duties and those which he might be called upon to undertake in action. As a general guide it may be stated that the upper desirable limit is 86° F.

A box of instruments has now been produced for measuring the effective temperature of compartments on board ship. These instruments include:—

A whirling hygrometer.
A silvered kata thermometer (130° F.—125° F.).
A silvered kata thermometer (150° F.—145° F.).
A globe and globe thermometer.

The box also contains surface contact thermometers, a stop watch, a vacuum flask and means for supporting the globe and globe thermometer.

The whirling hygrometer.—This form of hygrometer consists of a wet and a dry bulb thermometer slung together in such a way that they can be whirled rapidly through the air. The wet bulb is kept moist by means of a muslin cover, the end of which dips into a small reservoir containing distilled water. When used the instrument should be whirled at arm's length for about thirty seconds and read quickly, the *wet bulb* temperature being noted first. This operation is repeated until two successive wet bulb readings are approximately the same, indicating that the lowest wet bulb temperature has been reached. Care should be taken when using the hygrometer to see that the muslin covering of the wet bulb is adequately wetted, that the observer's hands are kept away from the bulbs and stems of the thermometers and that he does not breathe on the instrument while reading it. It is especially important to read the wet bulb temperature first as it tends to rise immediately after whirling.

When the air is saturated with moisture no evaporation can take place from the wet bulb and the readings of the two thermometers will be the same. The drier the air the greater will be the evaporation from the wet bulb and the greater the difference between the wet and dry bulb temperatures; the difference in temperature is therefore a measure of the dryness of the air. The amount of moisture which air can hold depends upon the temperature, and as the temperature rises the capacity of the air to hold moisture also increases.

The moisture in the air can be expressed as either *absolute humidity* or *relative humidity*. By absolute humidity is meant the actual amount of water vapour present in the air and it is described as being so many grains per pound; by relative humidity is meant the amount of water vapour expressed as a percentage of the amount which is required to cause saturation in air of the same temperature. For example, a relative humidity of 75 per cent at a given temperature means that the air could contain 25 per cent more water vapour before it became saturated. It is the *relative* humidity and the information it gives regarding the evaporating power of the air which is such an important consideration when investigating atmospheric conditions.

The wet and dry bulb temperatures having been obtained with the whirling hygrometer, the relative humidity of the air can be found from humidity tables.

A considerable difference may exist between the temperature and relative humidity readings of the external air and those in a compartment on board ship and there may be marked changes in the external readings even during the twenty-four hours. It happens frequently that the relative humidity readings are higher at night, when the temperature is comparatively low, than during the day when the temperature is higher. The necessity for maintaining a moderately even thermal environment on board under varying external conditions is therefore an additional problem to be faced in designing warship ventilation, and it is not easy to state the desirable figure for any particular factor, e.g. the relative humidity, in the various compartments. A reading of 60 per cent at a dry bulb temperature of 65° F. may perhaps be given as a rough guide but, as the temperature of the compartment rises, so does the desirable figure for the relative humidity fall.

The kata thermometer.—The kata thermometer is an alcohol thermometer with a large bulb coated with polished silver. One type is graduated to show temperatures of 150° F. and 145° F. and is known as the *high* kata thermometer; a second type is similarly graduated to show 100° F. and 95° F. and is known as the *low* kata thermometer. Readings are made by first heating the bulb of the thermometer in hot water (conveniently carried in a thermos flask) until the spirit rises to about half way up the bulb at the top of the instrument and the column is free from bubbles. The silvered bulb should then be wiped dry with a clean cloth, after which the time taken for the spirit column to fall from the higher to the lower graduation is noted by means of a stopwatch. Three or four such readings should be registered and from them the average number of seconds taken. In order to calculate the *cooling power* (of the air [illegible] for each thermometer and is to be [illegible] the stem) is divided by the average cooling time in seconds. This calculation can be avoided, however, by using a chart included with the set of instruments which also enables one to calculate the air velocity in feet per minute.

The globe thermometer.—The globe thermometer consists of a hollow metal sphere, six inches in diameter, coated with matt black paint and containing a thermometer with its bulb at the centre of the sphere. The temperature recorded by the instrument depends upon the environment in which it is placed and, if the walls and other surfaces which surround the globe are warmer than the air, the temperature recorded by the thermometer inside the globe will be above the air temperature as shown by the dry bulb reading. On the other hand, if the surrounding surfaces are cooler than the air in the compartment, the globe thermometer reading will be less than that of the air temperature. Therefore, the globe thermometer measures the degree of radiation from surrounding surfaces.

The necessity for using the globe thermometer arises from the fact that in ships in certain compartments there may be a considerable amount of heat radiated from hot surfaces which must be taken into consideration when estimating effective temperatures. As a rule the globe thermometer should not be read until it has been in position for at least twenty minutes. When its readings are used in calculating effective temperatures the results are known as *corrected* effective temperatures, and are found from tables in which the air velocity and the wet bulb readings are also used. From the above it will be seen that once the readings of the dry and wet bulb, kata and globe thermometers have been obtained, all further calculations may be made by means of tables.

These tables are included with the sets of instruments which it is hoped will one day be obtained in sufficient supply for use in the Navy afloat. The very few already available have been issued to Naval Medical Officers of Health and Fleet Medical Officers.

CLINICAL ASPECTS OF WOUND SHOCK

BY

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Historical

The term "shock" has been loosely applied to the varying physiological and pathological responses of the body to injury. The absence of a standard definition makes any comparative study difficult. Discarding those definitions based on specific clinical signs or on individual theories of origin, Moon (1942) has introduced a fairly comprehensive description as follows: "Shock is a disturbance of fluid balance resulting in a peripheral circulatory deficiency which is manifested by a decreased volume of blood, reduced volume flow, haemoconcentration and by renal functional deficiency." This definition summarizes the present general conception of the condition but account must also be taken of the diverse causes which may initiate shock and of the wide range of clinical findings in different cases.

In 1939 the treatment of wound shock was planned from experience in the war of 1914–1918 and on subsequent observations in the intervening years of peace (when there was much development in the study of traumatic surgery) and correlated with experimental research in the same period. The situation was by no means clear cut owing to the diversity of aetiological theories—often antagonistic in their therapeutic interpretation. "Pain, loss of heat, bleeding and toxaemia (bacterial or other)" were the factors stressed in 1918 (Mitchener and Cowell 1939). McDowall (1940) a physiologist reviewing the subject listed the possible factors concerned in the production of wound shock as follows: haemorrhage, toxins, vasoconstriction, reflex vasodilatation, post excitement depression and central exhaustion. These six headings might have been augmented but serve to indicate the confusion. No primary aetiological factor could be accepted and made the basis of therapy.

Conflicting opinions cannot be evaluated here but reference should be made to Cannon and Bayliss who with others supported the toxin theory of wound shock, to Blalock who stressed that loss of fluid into injured parts lowered the circulating blood volume, to O'Shaughnessy who described experiments demonstrating the effect of pain or other nervous stimuli in producing the shock picture. Although such theories influenced therapy it was essential to consider the condition in its fully developed state and to treat it as it presented in the individual case. The main therapeutic effort was therefore directed at the restoration of an efficient circulating blood volume and appropriate intravenous fluids were used for this purpose.

The years preceding the war of 1939–1945 saw considerable development in blood storage methods, in the preparation of plasma and serum derivatives and in the technique of intravenous therapy. In later years critics may suggest that this preoccupation with replacement therapy has amounted to an obsession and that other angles of approach have been neglected. But the war ends with an acceptance that transfusion of blood or blood derivatives remains the sheet anchor in the treatment of wound shock. Transfusion has stood the test of a prolonged period in which unprecedented numbers of war casualties have been treated for shock. Most surgeons are agreed there has been a marked reduction in mortality and morbidity when the method has been applied intelligently.

ASSESSMENT

Wound shock is readily diagnosed and fulfils the usual textbook criteria in many cases, but in some instances the individual response is difficult to assess. There is danger in attaching too much importance to individual signs or symptoms. For example, many surgeons had suggested that the blood pressure reading was an almost infallible guide to the degree of shock, but the weakness of this method is apparent by reference to Grant and Reeve (1941) and many other writers. Serial blood estimations may be similarly misleading if considered without correlation to other findings. In practice it is found more helpful to consider each case as an individual problem and to make a rough estimate of the degree of reaction to be expected from the type of injury in the particular case. By considering the lesion initiating shock, by studying the type and history of the subject, and by forecasting the probable course of events following injury—even approximately—appropriate therapy can be applied with effect.

In many cases of war injury lesions are multiple, but it is often possible to recognize an individual lesion which is most likely to initiate and to aggravate shock progressively if the lesion is not eradicated. In severe thermal injuries the process is relatively obvious: from the burnt superficial tissues there is a leakage of fluid which on analysis can be shown to be derived from blood plasma. This same fluid may escape externally, accumulate in blister formations or in deeper tissue layers. Terminal sensory nerves are exposed and impulses accumulate to complicate the picture and may increase local oedema by producing reflex vascular dilatation. If the circulating blood volume is so diminished as to cause relative failure or inefficiency of cardiac output, the vicious circle of anoxia and endothelial damage may complete a lethal picture. Should the victim escape this effect he may drift into the later and equally dangerous stage of toxic absorption—whether the toxins are bacterial in origin or derived from the products of tissue destruction is immaterial. The recognition of such a cycle of events permits of a logical plan of treatment. Relief of pain, replacement of lost plasma constituents, oxygen, elevation of burnt parts and local treatment of the burnt areas to prevent oedema and infection are indicated.

Other injuries do not allow of such analysis, however, and the picture is confused. Between the case of pure plasma loss, as in burns, and the equally clear sudden loss of whole blood constituents in hemorrhage from cleanly incised wounds of major vessels lie the innumerable examples of mixed injuries wherein all possible shock producing factors may be present. These complicated cases are not readily elucidated and their assessment must be made by clinical acumen rather than by the application of any laboratory method or formula. At this point it is as well to insist that the effects of "shock" and "hemorrhage" cannot be divorced practically.

As a guide to the conduct of treatment in cases of wound shock the following suggestions were circulated in a naval hospital (Royal Naval Hospital, Plymouth, 1941).

(1) *Type of patient.*—The very young and the very old stand shock badly. The healthy young male adult may not react as well as expected owing to previous exhaustion, blast effects or extreme dehydration. In civilian cases the possibility of disease being present must be considered, e.g. diabetes, high or low blood-pressure conditions and the anaemias.

(2) *Type of wound.*—Emphasis must be laid on limb wounds with extensive muscle damage as these produce prolonged and progressively severe degrees of shock. Crushing wounds of limbs are similarly dangerous. Burns and regional wounds (e.g. abdominal wounds) each bring their particular problems.

(3) *Blood pressure.*—A single reading is of little value. Hyperpiesia may

occur in the [illegible] type of shock and if the condition is not recognized a more favourable prognosis than is warranted may be made. A pale patient with severe wounds and high blood pressure may suggest this condition. A pale patient with a low blood pressure seen shortly after injury, is likely to be in primary shock of vaso vagal origin. Of real value is a series of blood pressure readings taken by the same person on the same instrument and considered in relation to the type of injury, resuscitation and operative treatment. Persistently low blood pressure despite energetic resuscitation is thus grave; a rise in blood pressure maintained throughout treatment is hopeful. It is dangerous to specify "safe" limits for these readings but a systolic pressure below 100 which persists is dangerous. Quantitatively a fall of systolic pressure 38 below normal may indicate that the cardiac output is halved. A figure of 60 systolic may indicate that the circulating blood volume is reduced to as little as four pints and that transfusion of at least six pints of a suitable fluid is therefore required to correct the deficiency. Pulse pressure is a valuable clue to the circulatory condition but with a low systolic pressure it may be difficult to record the diastolic level.

(4) *Blood picture.*—Blood counts are not very helpful during the acute development of wound shock except in cases of burns where an estimation of hæmoconcentration may be of value in determining dosage of plasma or serum. Two or three days after injury when the blood picture has become stabilized by hæmodilution and by the correction of the balance between blood and tissue fluids estimations are helpful in deciding whether further blood transfusions are required. In the rush of casualty work it is not always easy to command full laboratory resources for the more detailed methods of analysis of plasma proteins and of corpuscular volume.

The treatment of wound shock was based on the recognition of three factors accepted as playing an important part in the production of the condition and therefore therapy was considered under three headings:—

(1) Control of pain by suitable drugs and by rest to the injured parts.

(2) Control of toxic absorption (whether bacterial or biochemical in origin) by rest and by early operation to amputate, excise, drain or decompress damaged areas of tissue.

(3) Restoration of efficient circulation with regard to quantity and quality of the circulating fluid, this to be achieved by intravenous transfusion of blood or plasma derivatives and assisted by oxygen therapy.

Such treatment was divided into two main groups—general and intensive therapy.

GENERAL MEASURES

Rest.—All movements of the patient were restricted to the minimum necessary for complete examination and for resuscitation. Temporary splinting by means of heavily padded Cramer wire splints moulded to suit individual cases was less disturbing than was the use of specialized splints such as the Thomas. In a few cases skeletal traction was applied by the insertion of a Steinmann pin under local anæsthesia and the leg supported on a Braun frame.

Heat.—The danger of overheating was recognized and avoided by the use of thermostatically controlled shock cages. The ward was kept very warm as this afforded the best method of maintaining the temperature of the patient.

Posture.—By raising the foot of the bed 18 inches it was likely that a depleted circulation was concentrated to the more vital areas. It was insisted that any sudden change of posture would be detrimental.

Use of drugs.—In cases of severe pain morphine was not withheld. It was preferable to give an intravenous dose of 1/6 gr. and to repeat this if it was not effective in fifteen minutes. Large subcutaneous doses were dangerous because records of dosage prior to admission to hospital were not always accurate. Absorption might be delayed in such cases and the drug might not take effect until the blood pressure rose following transfusion. This delayed action was seen frequently and was the reason for a disappointing collapse after an initial satisfactory response to therapy.

Removal of clothes.—Removal of *all* garments was an essential part of treatment. This allowed complete examination and the application of heat. Clothes were cut off in badly shocked cases.

Fluids by mouth.—These were allowed where there was no obvious contra-indication. Sweetened tea was most acceptable and it was physiological to add a pinch of salt. In severe cases of shock the value of fluid by this route might be negligible but the relief of thirst was comforting. In dehydrated patients fluids could be given with impunity before anaesthesia as absorption was rapid.

Mental state.—The effect of mental impulses on shock is uncertain but reassurance and encouragement were of incalculable benefit. It was well to suggest to patients that they were safe from further danger—this was difficult if explosions or gunfire were still audible and fear of further disaster may well have turned the scale in some cases.

Intensive Measures.—Transfusion and Oxygen Therapy

Transfusion

If a patient required transfusion this might have to be continued before, during and after operation. On successful transfusion depended the life of the badly shocked man and therefore technique had to be as perfect and as foolproof as possible.

Technique.—The intravenous route was the method of choice and not displaced at the end of the war by other alternatives, e.g. transfusion into bone marrow or into the corpora cavernosa. The arm was used for preference unless one upper limb was severely injured and the other required for the continuous application of a sphygmomanometer cuff. In the arm a vein was selected on the postero-lateral aspect of the forearm at the junction of the middle and lower thirds. The antecubital veins were avoided as splintage is necessary in this position, whereas if the lower forearm was used the patient could lie with his arm unrestricted. In the leg a constant vein was always to be found just anterior to the tip of the medial malleolus. The choice of a needle or cannula rested with the individual but experience suggested that it was [illegible] to perform the small [illegible] required to insert a needle. This was especially the case when patients had to be transferred with a drip in use from ward to theatre along blacked out corridors. In some cases spasm of veins was so extreme that a needle could not be inserted blindly into the narrowed vein. In the field or on board ship a needle might be used for preliminary transfusions; in hospital a cannula was insisted upon. The casual transfuser in the Navy was more likely to get good results if he took the trouble to use a cannula. Many cases were seen where much blood or plasma had been lost subcutaneously due to the needle being displaced from the vein. In the Army it was more usual to use the needle but this was usually inserted by a transfusion officer who had acquired considerable skill in that method.

Transfusion apparatus has been described in detail on many occasions. One point must be insisted upon and that is the complete standardization of all equipment preferably throughout all the medical services. In the Navy this standardization was eventually achieved but in the first two years of the War confusion was rife owing to the extreme variety of equipment issued and because of the different sources from which transfusion fluids were obtained. The standard set issued by the Royal Naval Blood Transfusion Unit has proved adequate for all purposes. An additional item was the provision of the bellows of an atomizer spray which could with advantage be applied to the air inlet of the apparatus to produce an increased pressure where that was required.

Transfusion fluids.—In the earlier years of the war citrated plasma and stored blood were readily obtainable at larger centres, whereas in ships or abroad such supplies depended on the initiative of local medical officers. Later years saw the provision of lavish supplies of dried serum to all units of the Navy and the establishment of elaborate blood banks in most theatres of war. Other intravenous fluids known at the beginning of the war—saline in various strengths, glucose saline solutions and gum saline—were not accepted as suitable for use in the treatment of acute cases. In post-operative cases glucose saline was of value in maintaining or correcting fluid balance. Animal plasmas and artificial colloids (e.g. gelatine solutions) were not used, their preparation being in the experimental stage still.

Dangers of transfusion.—Whitby (1942) has discussed the hazards of transfusion fully. Systemic reactions in the form of rigors were usually due to faulty preparation of transfusion fluids or apparatus. Such reactions were reduced to a minimum with standardization of preparation and equipment. Circulatory or vascular disasters were rare and it is reiterated that the risk of overloading the heart in a previously healthy subject is negligible and one that must be taken. As Whitby states, "In casualty work failure to restore blood volume is a danger greater than overloading the circulation." Severe pulmonary oedema was seen with uncontrolled use of crystalloid fluids rather than with protein derivatives. Intravascular hæmolysis due to incompatibility was rare and the mechanism of this phenomenon has been considerably elucidated with the recognition of the Rhesus factor and subdivision of four previously accepted serological groups. Again the occasional disaster from incompatibility must be risked and the warning signs should be known to all. The chances of transmission of syphilis were low with serological checks on donor blood. Malaria, theoretically transmissible through stored blood, has not been encountered. An embolism during transfusion was avoided but as Simpson (1942) has shown it may occur where there is careless or unintelligent use of transfusion apparatus.

Dosage.—An assessment was made of the probable loss of circulating blood volume. This was necessarily approximate and might be related to blood pressure findings, blood estimations, visible blood loss or extent of area damaged. In cases of burns plasma alone was required and the amount could be calculated from formulae as described by Black (1940) utilizing laboratory means. In the intermediate type of case therapy depended on available supplies of plasma or stored blood. A suggested table of dosage for general use was as follows:—

TABLE I

Estimated loss of circulating blood volume	*Dosage*	
	Blood (pints)	*Plasma or serum*
2 pints		2
3 pints	1	2
4 pints	1	3
5 pints	2	3
6 pints	3	3

This scale was used as a rough guide with satisfactory results. It should be noted that as the loss increases there must be an increasing proportion of blood in the total transfusion. If a patient required transfusion it was considered that he must have at least two pints of blood or plasma and seldom less than three. In some cases dosage had to exceed six pints as loss of blood or serum might continue during resuscitation or at operation.

Rate of transfusion.—The more shocked the patient the more urgent became the necessity for correcting his depleted circulating anoxia with irreversible consequences. In severe cases the first two pints of the transfusion were given rapidly and if necessary assisted by pressure at the air inlet. Elevation of the limb and, especially when the leg was used, application of hot water bottles along the limb assisted administration. Two pints were thus given in ten to fifteen minutes. After the preliminary two pints, and if some response was noted, the drip was continued but slowed to 150 to 170 drops a minute. When improvement was consolidated and the patient thought fit for operation the drip was slowed to 60 to 120 drops a minute and accelerated again if there was any relapse at operation. After operation it was usual to continue a saline drip at 30 to 40 drops a minute so that the patency of the apparatus was maintained and that further blood or plasma could be given if necessary. In severe cases fresh blood given as a slow drip after operation was of great value in restoring the normal blood picture and probably in improving the general resistance. As noted above the danger of "over loading" in shocked cases was a justifiable risk. The rate of transfusion was controlled by study of the response in individual cases and not by the application of fixed rules.

Oxygen Therapy

If the significance of anoxia in wound shock is as urgent as most workers suggest then the methods of administration of oxygen deserve consideration in detail. Although there is conflicting opinion as to the practical value of oxygen in shock therapy, Moon (1942) and many others affirm that its use is logical and that it assists in correcting circulatory deficiencies and may even break the vicious circle of anoxia in advanced cases. The value of oxygen therapy in a series of air raid casualties has been commented upon (Shepherd 1941).

Technique of oxygen therapy.—The best method available was by the use of the B.L.B. mask. By this method the concentration of oxygen administered was high, the rate of flow was readily controlled, the mask did not induce a sense of claustrophobia in the nervous case, and the nasal inhaler permitted the ingestion of oral fluids. The abolition of older methods of oxygen administration was insisted upon but even the hopeful wafting of a glass funnel before the face was a habit which died hard.[1] Oxygen therapy depended on a well organized supply of the gas and this was more readily found in hospitals than afloat or in the field. The few reports on the use of oxygen indicate that only a small number of centres were equipped for continuous oxygen administration to large numbers of patients.

Transfusion results were improved if oxygen could be given during the period wherein the blood volume was corrected. This was especially the case following severe hemorrhage with red cell deficiency. In chest cases success with oxygen therapy was readily apparent and often dramatic. In other cases improvement could be judged only on general clinical grounds but it was noteworthy that many patients expressed the opinion that they benefited from oxygen. A few patients became restless under oxygen and the treatment could not be continued.

The B.L.B. mask has been described fully throughout its development and the only point requiring stressing here is that all medical officers and nursing staff had to acquaint themselves with full details of its use and be prepared to maintain the apparatus satisfactorily.

A natural corollary to pre-operative oxygen administration was the insistence on high oxygenation throughout anaesthesia. The danger of sudden decrease of oxygen intake was recognized.

Operation

It was too readily forgotten that operation was an integral part of shock treatment. All other anti-shock methods were directed at getting the patient fit for operation where the major cause of the condition could be eradicated. The dictum "too shocked to be touched or to go to theatre" had caused incalculable harm and it was difficult to convince many surgeons that in some cases a patient was so shocked that his only hope lay in early operation. The principle was adopted that intensive resuscitation should put the wounded [illegible] grade and that operation should finally control the factors [illegible] The control of severe hæmorrhage is the simplest example of [illegible] procedure which diminishes shock. Similarly the excision of an [illegible] and the closure of the affected limb in plaster [illegible] blood and plasma loss which produces the shock picture. Other cases are less obvious, e.g. the optimal time to amputate a crushed limb is difficult to decide. Infection is a further peril and it is difficult to define where the wound shock picture merges into that of toxæmia from bacterial invasion of damaged areas.

Anæsthesia

The importance of adequate oxygenation has already been noted. The anæsthetist had to continue resuscitation throughout operation and this was not easy when at the same time the surgeon asked him to eliminate pain, to maintain body temperature, to prevent anoxia and to give adequate muscular relaxation. Induction with pentothal was satisfactory and maintenance of anæsthesia was achieved by the expert most satisfactorily with gas, oxygen and a minimum of ether. The less skilled (or less well equipped) induced with pentothal and maintained with ether by mask or by means of the Oxford vaporizer. Local anæsthesia was used for head wounds but not for other cases as a rule. Theoretically it is the ideal anæsthetic in wound shock but there are great practical limitations.

Blast Lesions Complicating Shock

The symptoms and signs of blast lesions will not be discussed here. The practical problem was the prevention of œdema of the lungs where there was blast injury to the chest, as patients with blast lung tended to develop terminal œdema of the lungs following transfusions on a lavish scale. The possibility of transfusions of serum in high concentrations suggested itself. It was difficult in the acute stages following injury to differentiate wound shock and blast effects, and belated relapse after transfusion was accounted for by such additional lesions.

Fat Embolism

This tends to occur after the period of wound shock and was another cause for relapse after apparently successful resuscitation. The condition has been discussed fully in the war years.

The methods of treatment commented upon above have been used consistently by the writer during the last five years of war. It is believed that they are, in general, representative of those used by many other naval surgeons, and much of the material on which this study is based is derived from cases observed in a home naval hospital. It is obvious that resuscitation in hospital must differ from that in the field or afloat, but it is equally certain that the principles of treatment are the same in all cases, although equipment and staff organization are likely to be more efficient in hospital. Throughout the war there has been an increasing enthusiasm on the part of medical officers to employ transfusion and other active treatment even in the most difficult local circumstances. The days of heavy morphinization and relative inactivity have passed.

The war has seen no dramatic advance in the treatment of wound shock. Much that was forgotten has regained prominence and the acceptance that transfusion is our strongest weapon has led to unmistakable improvements in the technique of that form of therapy. The procedures discussed above evolved largely in 1941 need not be altered in the light of present knowledge except with regard to two points. First, the insistence of adequate transfusion with whole blood—the proportions of blood and serum suggested in Table I might with advantage be altered so that in all cases at least 50 per cent of the transfusion should be blood. Secondly, the danger of overheating must be stressed and it is doubtful whether shock cages, even thermostatically controlled, have any place in the armamentarium against shock.

Resuscitation depending largely on transfusion cannot be the final answer in shock therapy. Other methods deserve notice and the surgeon is stimulated to find some other approach to the problem. Stern (1942) for example has suggested the use of cisternal injections of potassium salts in severely shocked cases. Suprarenal extracts or synthetic preparations of the same type also have been given in an attempt to assure better results. Such methods will of necessity require concurrent transfusion.

Although the problems of wound shock remain unsolved, the war has resulted in the accumulation of a wealth of clinical records and of technical knowledge from which some advance in knowledge can surely be gained. Above all, the clinical experience accumulated by individual medical officers can be applied in the traumatic surgery of everyday life—in days when the increased tempo of road, rail and air traffic will exact a toll of injury accompanied by the most severe type of wound shock.

APPENDIX I

Illustrative Cases.

Case I.—Hypertensive Shock.

An airman aged 31 was injured in a motor cycle smash and was admitted to hospital two hours after injury. He had sustained a gross compound injury of the right leg involving the knee joint, for which a tourniquet was in position at the mid thigh, but this was ineffective. He was severely shocked, pale, fully conscious, pulse 90 per minute and blood pressure 180/90. He had probably lost two or three pints of blood. As he was in severe pain local anaesthetic was injected above the site of injury, but there was [illegible] and ½ gr. morphine was given intravenously. Loss of blood was continuing and so the tourniquet was reapplied. Two pints of stored blood were given in an hour, after which he vomited profusely. Four hours after injury a rapid amputation was done through the lower thigh using gas and oxygen with some ether. A further pint [illegible] of plasma were given during operation. He died shortly after leaving the table.

Comment.—The high blood pressure recorded on admission might have suggested a good prognosis, but the gross local limb injury was likely to [illegible] of shock. Death ensued despite intensive resuscitation and early operation. This is the type of case where it is difficult to estimate the optimal time for operation, but [illegible] impossible in case of further haemorrhage and [illegible]. It might have been justifiable to apply local refrigeration of the limb and to have performed amputation later.

[illegible] *Hypertension* [illegible]

[illegible] aged 22 [illegible] admitted following injury three hours [illegible] had sustained [illegible] compound fracture of the femur, simple fra[illegible] scalp laceration. His blood pressure was 160/85 [illegible] Shock relapse was anticipated in view of the severity of his injuries and [illegible] pints of [illegible] preoperatively. His good condition was maintained [illegible] procedure performed.

[illegible] transfusion may not have saved this man's life but he [illegible] better state than would have been the case had he not been [illegible]

[illegible] *Blood pressure Readings*

[illegible] 37 was admitted to hospital three hours after injury in an air raid [illegible] had torn his right posterior thigh to shreds but the femur was undamaged [illegible] gaping wound there was a constant drip of plasma-like fluid but there [illegible] haemorrhage. His general condition was fair, with a blood pressure of 110/85 [illegible] two pints of plasma rapidly and his blood pressure rose to 160/85. He had [illegible] in a hard pressed theatre and after a third pint of plasma his pressure [illegible] After a fourth and fifth pint of plasma he was sent to the theatre with [illegible] 110/60. An upper thigh amputation was carried out with the patient [illegible] position in which he had been resuscitated. Post operatively he had four [illegible] after an anxious ten days made a good recovery.

[illegible] all this man had five pints of plasma and four of blood. Operation [illegible] earlier when the blood pressure was fairly high but fortunately [illegible] controlled by transfusion and a successful result was obtained despite the [illegible] and a severe operation. Without a blood pressure record it would [illegible] difficult to assess the condition.

[illegible] *Skeletal Traction*

[illegible] was admitted after being pinned in an air raid shelter by heavy concrete [illegible] admission his pulse was impalpable and his blood pressure unrecordable. [illegible] showing multiple fractures and fracture-[illegible] pints of plasma were given under pressure and the [illegible] Blood pressure was then recorded at 60/?. Under local [illegible] inserted through the tibial crests. Skeletal traction was [illegible] partially reduced. There was an immediate [illegible] and this was maintained with a further transfusion [illegible] with oxygen by the B.L.B. mask.

[illegible] the initial plasma transfusion appeared to be life saving, the [illegible] skeletal traction was dramatic in the extreme and [illegible] his survival.

[illegible]

[illegible] burned about his face, neck, arms and legs as a result [illegible] hours after injury he was admitted to hospital [illegible] transudation of serum from the burnt areas. The [illegible] burned and with some difficulty a vein was dissected [illegible] undamaged area. The vein was thread-like in [illegible] transfusion. Eventually a cannula was inserted [illegible] With transfusion of four pints of serum [illegible] shock was countered. He ultimately made a good [illegible]

[illegible] spasm of veins which may be encountered [illegible] might have been attempted here and the [illegible] delay.

Case [illegible] [illegible] Saline Transfusion

A man aged 41 [illegible] with gross multiple [illegible] amputation [illegible] below knee and [illegible] of saline [illegible] The blood pressure [illegible] as 110/90 when he [illegible] pints of normal saline through an [illegible] period [illegible] except [illegible] Twenty four hours after [illegible] of the lungs [illegible] died two days after [illegible] the sacral [illegible] and scrotum At post-mortem [illegible] full of fluid

Comment —This man had severe injuries and [illegible] prognosis generally However he did [illegible] saline cannot be proved to have caused his death [illegible] factor in producing this fatal disturbance of fluid balance

Case [illegible] —Concentrated Serum in Blast Cases

A man aged 32 was admitted to hospital in a dazed [illegible] near miss by an aerial bomb He had haemoptysis and [illegible] concussional signs In twenty four hours he was stuporous [illegible] 100 c c of concentrated serum—five [illegible] intravenously with a dramatic return of consciousness [illegible] four hours his condition relapsed Two further injections [illegible] gave diminishing responses and the effect was of shorter duration He died [illegible] days later A post-mortem was not obtained

Comment —The dramatic improvement in this case was only temporary but suggested that concentrated serum might be of value in cases of oedema of the brain due to direct or indirect causes The lesions were almost certainly due to blast

APPENDIX II

Preparation and Equipment of a Resuscitation Ward

Choice of ward —A ward should be chosen which has reasonable protection against enemy action. Communications with the operating theatre and other essential departments must be adequate and lifts should not be essential to these communications Windows should be built in and adequate ventilation substituted

Heating —Heating must be maintained constantly above 70° F and below 75° F Local heating arrangements should be available in case of breakdown of general heating in the hospital

Lighting —Normal ward lighting should be augmented by the use of high powered bulbs but patients should be saved from direct glare if possible Wall plugs should serve every bed so that spot lights can be plugged in for examination or during transfusion procedures Emergency lights in the event of failure of electricity are essential and provided by paraffin lamps and electric hand lamps

Water —Constant hot water is necessary and local arrangements must be made (e g primus stoves) to provide this in the event of failure of main heating Emergency sterilising arrangements also must be available

Beds —These may be made up with double rubber sheets The patients are put between old blankets on top of the first rubber sheet on admission. When they have been examined and cleaned up the dirty blankets and top rubber sheet are removed. Each bed must have a bag to hold the patient's clothes and other effects until these can be conveniently checked. Beds should be numbered clearly.

Special Equipment for Resuscitation

(1) *Bed blocks* (or other devices).—These must raise the foot of the bed 18 inches to 24 inches if necessary, and graded supports are most convenient.

(2) *Heating equipment*.—Hot water bottles should be provided at the rate of two for each bed. Electric blankets and thermostatically controlled shock cages must be available at the rate of one of each for every two beds. (Electric points must be provided accordingly.)

(3) *Oxygen therapy*.—Oxygen should be laid on a pipe line with large central reservoirs to ensure a constant supply, each bed to be equipped with an individual flowmeter to which a B.L.B. mask can be applied. One B.L.B. mask for every two beds is sufficient.

(4) *Transfusion apparatus*.—Each bed should be fitted with an adjustable drip stand of a design which can be fixed to head or foot of the bed by simple manipulation, and giving sets must be supplied on a lavish scale according to the number of beds and the available supplies.

(5) *Instrument trolleys*.—At least two trolleys should be provided with complete equipment for cutting down for transfusion, also a trolley complete with equipment for insertion of pins for skeletal traction, and another to carry diagnostic equipment, catheterization, lumbar puncture and rectal examination being provided for. Two trolleys are required for carrying equipment for performing simple sterile dressings which may require to be applied after patients have been examined.

(6) *Blood pressure apparatus*.—Each bed should have a sphygmomanometer cuff for application and retention on each individual patient's arm. The recording apparatus should be detachable and carried round with the stethoscope from one patient to another, thus eliminating the disturbance of tying and untying the arm band.

(7) *Splints*.—All sizes of padded Cramer wire splints should be provided which can be bent and moulded to suit particular cases. A few Braun splints may be of value.

(8) *Scissors*.—A supply of really large tailor's scissors is required for cutting clothes.

(9) *Tourniquets*.—Tourniquets of the Samway pattern are suitable.

(10) *Drugs*.—Few drugs are necessary. Morphine in solution ready for injection and the appropriate pre-operative drugs are all that are required. Antitetanic and gas-gangrene sera will be supplied according to the local organization of the hospital. Adrenalin is provided on the cutting down trolley. A supply of local anaesthetic also should be available. (Syringes suitable for all these injections must be ready in quantity with facilities for sterilizing quickly.)

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Clinical Notes and Cases

REPORT OF A CASE OF MIXED SALIVARY TUMOUR

BY

Surgeon Commander J. A. PAGE, R.N.

Mixed tumours of the parotid gland are not infrequently met with, the parotid being affected in about 90 per cent. of all cases of mixed salivary tumour. The condition is fortunately recognized early and can usually be removed surgically before gross destruction or erosion of surrounding tissues supervenes.

The tumours are usually well encapsulated, particularly in the slow-growing variety, where there is a superabundance of myxomatous tissue enclosed within a dense fibrous stroma and a less well differentiated cellular structure. Next in frequency the submaxillary and sublingual glands are affected and occasionally such tumours arise in the lips and mucous membrane of the buccal cavity and nasopharynx.

In the case under review the tumour arose from the buccal mucous membrane and was of such gross dimensions and long duration that it is perhaps worthy of publication.

Case History.—The patient [illegible] Officer, aged 42. He first complained of a painless swelling in the mouth [illegible] Singapore in 1941. Before full investigation and hospital [illegible] could be arranged Singapore was [illegible] by the Japanese and he was taken prisoner. During the next three years the mass [illegible] and ulcerated [illegible] which had been extracted by the [illegible]

When he first came under my care in January 1945 [illegible] the condition was as follows:

The patient was in a poor general condition [illegible] camps and many months of severe pain and sleepless nights. A large [illegible] displaced [illegible] but some [illegible] I am [illegible] is and [illegible] that [illegible] were sacrificed. [illegible] about ¾ [illegible] the prominent [illegible] The carotid [illegible] discharged [illegible] leucocytes.

[illegible] part [illegible] fat.

[illegible] ligated [illegible] On 4th [illegible] mandibular [illegible] to 95 per cent [illegible] This gave enormous [illegible] relief.

On 17th February 1945 the patient developed [illegible] complete occlusion of the glottis. As an emergency measure the [illegible] ligated under local anæsthesia and sodium [illegible] and a tracheotomy [illegible] readiness. I had already planned to ligate the [illegible] as a preliminary to further operation as it was apparent that if left the condition would [illegible].

As a result of this procedure the oedema [illegible] and the [illegible] appeared to reduce in size but the ulceration [illegible] discharge persisted. It was possible however to give some nourishment [illegible] and at the end of three weeks it was considered fit to undergo the radical operation.

Operation.—Under avertin anæsthesia and local infiltration with [illegible] per cent [illegible] tracheotomy (high) was performed and when breathing [illegible] a small No. [illegible] rubber catheter was passed through the tracheotomy tube and ether vapour insufflation commenced (Junker method). A [illegible] sponge was then introduced into the larynx to prevent aspiration [illegible] the [illegible] with iodine and ether and towels placed in position.

An incision was made from the outer lower angle [illegible] medialwards [illegible] then down along the naso-buccal fold and continued downwards one inch lateral to the outer angle of the mouth to the under side of the mandible and laterally [illegible] the mandible for about two inches.

The flap was dissected up taking with it the subcutaneous tissues and fat and the [illegible] facial muscles. This was accompanied by considerable venous and arterial bleeding which was soon controlled. The suctorial pad of fat was easily identified [illegible] this structure the tumour mass covered by a glistening [illegible] capsule was [illegible] in front of the anterior border of the masseter muscle. The [illegible] of the tumour was then cleared of its coverings by blunt dissection separating the [illegible] fibres of the posterior part of the buccinator muscle and lower fibres of the [illegible] part of the temporalis muscle. The mass was found [illegible] separate easily but [illegible] the posterior and deep aspects of the tumour to be freed the masseter muscle was [illegible] its upper attachment and retracted downwards drawing the parotid gland [illegible]. When it was in close apposition to the front of the deep part of the ramus of the [illegible] the portion of the bone was paper thin and gave way under the finger. This [illegible] the mandible about ½ inch to 1 inch wide by 2 inches long was snipped away the [illegible] around the posterior portion of the tumour and the mass freed from the

[illegible]

[illegible]

ATYPICAL PRIMARY PNEUMONIA OF THE APICAL SEGMENTS OF THE LOWER LOBES

BY

Surgeon Lieutenant-Commander G. L. HARDMAN, R.N.

PRIMARY atypical pneumonia, as shown radiologically by consolidation limited to a single broncho-pulmonary segment, is commoner than is generally thought. During the past month more than a dozen new cases a week have been seen in the X-ray department at R.N. Hospital Haslar. These have frequently been found either at routine examination of chests in patients without symptoms who were going on draft, being demobilized, or invalided for a cause other than chest disease, or in patients being discharged from hospital as cured of a common cold. Few have shown chest symptoms or signs. For the radiological diagnosis it is essential to take a lateral film in addition to the P.A. view so that the segmental distribution of the lesion may be shown. This lateral view must be of good quality or the lesion will be missed. An excellent study of the segments has been made by Crysler (1946).

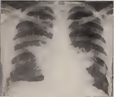
The commonest segment to be involved, both according to Crysler and from my own experience, is the dorso-basilar segment of the right lower lobe. In the P.A. view this is shown as an opacity, generally a well-marked increase in striation extending downwards and outwards from the lower part of the hilum and filling in the cardiophrenic angle. In the lateral view the segment is in the posterior costophrenic angle below the summit of the diaphragm.

The apical segment of the lower lobe may be involved. The appearance of this in the P.A. view can be confusing unless one is thinking in the three dimensions. It is projected over the hilum and gives the appearance of a greatly increased hilar shadow which may be thought to be of tuberculous origin or due to a neoplasm. The lateral view, of course, will clearly show the shadow to be behind the hilum and in the apex of the lower lobe. Simultaneous involvement of the apical segments of the lower lobes on both sides will cause an apparent enlargement of both hilar shadows, which appearance can be caused by congestion, Hodgkin's disease, pneumokoniosis, eosinophilia, Boeck's sarcoid or erythema nodosum.

The following case well illustrates the diagnostic difficulties that can arise from a single film.

Case History.—The patient, an A.B. aged 20, was admitted to hospital with a history of malaise and cough for three days. On admission his temperature was 100° F. and

[illegible]



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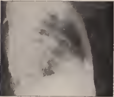
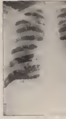


[illegible]



[illegible]

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[illegible] 56 [illegible]

TWO CASES OF ENCEPHALITIS FOLLOWING VACCINATION

BY

Surgeon Commander M. A. RUGG-GUNN, R.N.

POST VACCINIAL encephalomyelitis is a somewhat rare condition even in the Services where a fair number of primary vaccinations are done for the first time in adult life.

The actual incidence of the condition appears to be extremely variable, perhaps partly due to the fact that at times the disease appears to occur in minor epidemics and partly because the varying age at which primary [illegible] is carried out [illegible] countries [illegible] to its occurrence. It is [illegible] almost unknown [illegible] year of life and in the Dutch outbreak [illegible] it was found that there [illegible] approximately 1 case in every 2,500 primary vaccinations of patients [illegible] 1 year old and 1 in every 40,000 revaccinations but no case among the 18,000 vaccinations done in the first year of life. The incidence between the ages of 1 and 2 years is given as 1 in every 3,487 primary vaccinations and between 6 and 12 years as 1 in 815. Thereafter the incidence tends to decline and is rare after the age of 30. The risk among unvaccinated new recruits is therefore far from negligible.

Symptoms usually occur between about the tenth and twelfth days, though the time lapse may be much shorter than this, especially when they occur after revaccination. The outside limits of the incubation period are from two to twenty-five days. Headache is usually followed by drowsiness and pyrexia. Flaccid paralysis of the limbs and signs of meningeal irritation, but the clinical features are highly variable. The mortality rate is usually about 25 to 50 per cent.

Case Histories

[illegible] I.—N. V. H., aged 18.

The patient [illegible] was vaccinated for the first time on 10th February [illegible]. Three days later he complained of [illegible] slightly [illegible] physical signs [illegible]

He [illegible] until 22nd [illegible] rose a little and he complained of malaise and slight headache.

23rd February. His headache was rather worse and he appeared a little lethargic.

24th February. [illegible] he was lethargic and lay with his head turned [illegible] light [illegible] and he complained of a slight frontal headache. [illegible] per minute. There was a normal [illegible]

His condition [illegible] he was admitted to R.N. Hospital Haslar at 7 p.m. [illegible]

On admission [illegible] pulse rate 98 per minute.

The patient [illegible] and [illegible] the light. It was quite impossible [illegible] of the central nervous system [illegible] reflexes were [illegible]

The [illegible] fluid [illegible] slightly [illegible] cell blood [illegible] gave the following [illegible]:

[illegible]	[illegible] per cent
Chlorides	[illegible] per cent
Sugar	[illegible] per cent
Cells	[illegible] per c.mm.
	[illegible]

Wassermann [illegible] negative [illegible] change.

During the [illegible] the patient [illegible] though [illegible] fairly well. The temperature [illegible] 98 [illegible] 100 [illegible] between 90 and 98 per minute, although throughout the [illegible] change.

These two cases form a sharp contrast. Both were young [illegible] vaccinated for the first time, both started to show signs of central [illegible] system involvement about the eleventh or twelfth day and both [illegible] with sequelae; on the other hand Case I suffered a long drawn out [illegible] with an apparent relapse just as he was starting to improve and prolonged illness with signs of cerebral irritability but without focal signs, whereas Case II was essentially a mid brain or cerebellar lesion, temporary in nature and hardly affecting either the higher centres or the long tracts of the cord.

The cerebrospinal fluid findings in Case I are of interest: there was, to begin with, a slight rise in protein and a marked cellular response, this being followed by a return of the cells to normal and a marked rise in protein, and finally the C.S.F. returned to normal. In the second case the cerebrospinal fluid was normal throughout.

The improvement of Case I following the use of immune serum is of interest though it is impossible to say for certain what part it played in his recovery. Perhaps the most interesting feature of Case II was the generalized vesicular rash coming on two days after the vaccination: it is not absolutely certain whether this was a fortuitous attack of chicken pox or whether it was a generalized vaccinal eruption, as the process was well on the decline by the time he was admitted to hospital. Apart from the question of coincidence the bulk of evidence appears to be in favour of a vaccinal eruption, though the incubation period is admittedly extremely short.

Both cases eventually returned to full duty.

A CASE OF TRAUMATIC PERFORATION OF THE BOWEL

BY

Surgeon Lieutenant R. H. COWLING, R.N.

This case is submitted as being an unusual injury. It shows the development of the signs and symptoms for three hours after injury, and is noteworthy for the complete absence of localizing signs and for the unusually slow pulse rate. It is suggested that the retardation of the pulse rate, instead of the acceleration usually found in the shocked patient, is due to the stimulation of the vagus nerve caused by the injury to the abdominal autonomic nerve plexi.

The patient, a Sergeant physical training instructor aged 34, was admitted to the Royal Marine Infirmary, Deal, at 11.30 a.m. on 9th June, 1947, with a history that whilst exercising on the horizontal bar a quarter of an hour previously he had slipped and fallen a distance of approximately three feet, landing with his abdomen across the bar, the abdominal muscles being tense at the time.

[illegible] 48 per [illegible]

[illegible] system [illegible]

[illegible]

[illegible] palpable [illegible]

[illegible] 2.15 per [illegible] eight diaphragm [illegible] per [illegible]

[illegible] by Mr. [illegible]

[illegible]

[illegible] and [illegible]

Reviews

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] M.D. [illegible] 194[illegible] [illegible]

[illegible] November 194[illegible] [illegible]

[illegible]

[illegible] 1947 [illegible]

[illegible]

[illegible] for the [illegible] 1946 [illegible] New York [illegible]

[illegible] the hist[illegible] evolution [illegible] Middle A[illegible] a faithful [illegible]

The [illegible]

The [illegible] library [illegible]

[illegible]

[illegible]

[illegible]

[illegible] Rheumatic [illegible] 1947 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] well printed and indexed [illegible]

[illegible] in hospital [illegible]

[illegible]

[illegible] 1894 [illegible]

[illegible] 1891 [illegible]

[illegible] 1892

[illegible]

[illegible]

[illegible] M.R.C.S. [illegible]

[illegible]

[illegible]

[illegible] Hospital [illegible] Volume XIX 1945 [illegible] the Research [illegible] the Hospital [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

We acknowledge with thanks receipt of the following publications

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

News of the Service

VISIT TO MALTA OF THE MEDICAL DIRECTOR-GENERAL

The Medical Director General arrived in Malta on 20th April 1947 to carry out an inspection of the Royal Naval Hospital, Bighi, and other ships and establishments.

An [illegible] programme had been arranged. On arrival the Director called on the Commander-in-Chief, the Governor and Flag Officer Malta, and then proceeded to the Villa Portelli where he was the guest of Rear Admiral and Mrs. Kelsey during his stay. The Director's visit coincided with that of the Commissioner of the St. John Ambulance Association and he was able to witness a parade of the local Association from the Valetta Palace and to meet the Commissioner subsequently at an "At Home" given in St. Elmo Barracks. Monday was spent at the Royal Naval Hospital inspecting and interviewing members of the staff who wished to see him and discussing the future policy for the hospital. On subsequent days the Director toured the Island inspecting air stations, sick quarters and a selection of ships. His energy was unbounded and the attraction of the sea proved too much in that he expressed a desire to bathe. Fresh from the U.K. no doubt this appeared most attractive but it must be confessed that those members of his temporary staff who had already become used to the heat of a Malta summer did not view this desire with quite so much enthusiasm. However everyone survived the adventure.

The following entertainments were arranged in connexion with this visit. Dinner parties were given by Surgeon Rear Admiral and Mrs. Brownfield, Rear Admiral and Mrs. Kelsey and Surgeon Captain and Mrs. Weldon, and cocktail parties by the Medical Mess, Royal Naval Hospital (to meet all the

medical and dental officers of the [illegible] establishments), the Matron and Sisters, Royal Naval Hospital, and by Surgeon Captain and Mrs. Crawford. Unfortunately the Commander-in-Chief [illegible] from the Island except for the first day of the visit, but the Director [illegible] Admiralty House on that day and had an opportunity of [illegible] Admiral Sir Algernon Willis.

Surgeon Vice Admiral Cole[illegible] the Island [illegible] May in H.M.S. Sussex. His visit had proved most beneficial to all the medical branch in Malta in that it was felt he took a personal interest in the work and welfare of everyone he met He left with every good wish from us all for his personal enjoyment and for the success of his tour

ADMIRALTY FLEET ORDERS

1384.—Dental Officers—Short and Extended Service Commissions

(C.W. 5437/47.—18 Apr. 1947.)

The existing scheme for granting Extended Service Commissions to dental officers will close on 30th June 1947.

2. Dental officers who are granted Short Service Commissions up to 30th June 1947 will be required to serve for four years and on the completion of this full period [illegible] will be eligible for a gratuity of £625 tax free.

3. After 30th June 1947 dental officers will be entered for Short Service Commissions only for a period of four years at the end of which they will be eligible for a gratuity of £500 tax free.

4. In neither case will the Short Service gratuity be payable to officers transferred to the permanent list, but (subject to normal rules) previous service on Short Service engagement will count towards retired pay or gratuity on the permanent officer scales.

5. Dental officers who are called up for compulsory service may apply for a Short Service Commission at any time during their compulsory service. Service towards gratuity will count from the date of acceptance by the Admiralty for a Short Service Commission.

(A.F.Os. 3831/46 and 5417/46.)

1398.—No. 1 R.N. Orthopaedic Rehabilitation Centre—Transfer to Braintree

(M.E.C. 3151/47.—18 Apr. 1947.)

R.N. Orthopaedic Rehabilitation Centre, Bramley, transferred to White Court, Braintree, Essex, on 17th March 1947.

2. Telephone numbers are Braintree 740 and 741. There is also a direct line from H.M. Dockyard, Chatham. The telegraphic address is R.N.O.R.C. Braintree.

3. [illegible] being transferred [illegible] should be sent to Chelmsford [illegible] they should inform the ticket collector who will explain the arrangements [illegible] port to the Centre.

4. Only [illegible] naval ratings and Royal Marines other ranks can be received. There [illegible] for officers or W.R.N.S. Injured dockyard workmen can be [illegible] rotation and [illegible] stating their willingness to be [illegible] and their appreciation that they will receive [illegible] the same treatment as [illegible] naval ratings.

5. [illegible] should be sent to the Centre as soon as [illegible] and preferably [illegible]

6. [illegible] should [illegible] transferred [illegible] after [illegible]

7. [illegible] suitable for treatment.

8. [illegible] surgical and medical [illegible] Non-psychiatric patients [illegible]

9. [illegible] should [illegible] accompany patients [illegible] possible.

10. [illegible] patient from the Centre [illegible] ticket and X-ray films will be returned [illegible] together with the [illegible] of the case notes [illegible] the Centre [illegible] disposal.

11. [illegible] of transfer [illegible] the Centre [illegible] During the [illegible] pay and [illegible] When [illegible] transferred from the Centre the victualling transfer [illegible] showing the [illegible] victualled at the [illegible] against his [illegible]

(A.F.Os. 4857/45, 111/47 and 1169/47 [illegible])

1399.—Medical Officers—Short and Extended Service Commissions

(C.W. 5437/47.—18 Apr. 1947.)

The existing scheme as announced in A.F.O. 1846/46 for [illegible] Commissions for medical officers will close on 30th June 1947.

2. Medical officers who are granted Short Service Commissions [illegible] will be required to serve for four years and on completion [illegible] will be eligible for a gratuity of £750 tax free.

3. After 30th June 1947 medical officers will be [illegible] Commissions only for a period of four years at the end of [illegible] a gratuity of £600 tax free.

4. In neither case will the Short Service [illegible] be [illegible] the provisional list but (subject to normal rules) [illegible] Short Service engagement will count towards retired pay or gratuity [illegible] permanent officer [illegible]

5. Medical officers who are eligible [illegible] to complete [illegible] apply for a Short Service Commission at any time during their [illegible] Service [illegible] gratuity will count from the date of acceptance [illegible] Short Service Commission.

(A.F.O. 1846/46 and 5423/46.)

1476.—H.M.H.S. "Maine."—Paid Off

(M. 1713/47.—25 Apr. 1947.)

H.M.H.S. "Maine" was paid off as a hospital ship on 21st [illegible] was replaced by "Empire Clyde."

2. Correspondence and signals intended for the Medical [illegible] should be addressed to "Empire Clyde."

1499.—Medical Staff Duties of Surgeon Rear-Admirals at R.N. Hospitals Chatham, Plymouth and Haslar

(C.W. 6876/46.—25 Apr. 1947.)

The Surgeon Rear-Admirals at R.N. Hospitals Chatham, Plymouth and Portsmouth (Haslar) are to advise their respective Commanders-in-Chief on all medical matters [illegible] the medical and health organization of the Command and on the duties required of the medical officers serving in the Command.

2. They are to report to the Commander-in-Chief [illegible] the state of the sick in the hospitals within the Command.

3. They are to supervise and inspect as necessary the Royal Marine [illegible] and such parts of the various establishments in the Command [illegible] regarding them to the Commander-in-Chief from time to time. They are also to arrange for the [illegible] inspection of ships in the Command as required by the Commander-in-Chief.

4. During [illegible] they are to advise the Commander-in-Chief [illegible] on the disposition of the medical officers within the Command.

5. The appointments of the Surgeon Rear-Admirals [illegible] with the above instruction.

6. The necessary amendments to K.R. & A.I. Articles 1356, etc., will be [illegible]

1500.—Yellow Fever—Protective Inoculation

(M.D.G. 43544/46.—25 Apr. 1947.)

A.F.O. 1310/47 is to be amended as follows:—

Paragraph 8, last sentence should read—

After three months storage the vaccine should be discarded.

(*A.F.O. 1310/47.*)

1542.—Stretchers—Revised Allowances

(N.S. 18631/46/4B.—25 Apr. 1947.)

The allowances of stretchers in vessels of 2,000 tons and over have been [illegible] as follows:—

1. *Normal allowances*

		Peacetime Allowance	*War* [illegible]
Pattern 475	Neil Robertson	2 per cent. of peace-time complement	4 per cent. [illegible] complement
	War Office Type	3 per cent. of peace-time complement	7 per cent. [illegible] complement

2. *Special allowances to certain ships*

(a) For cruisers and larger ships fitted with high coamings [illegible] W.T. doors, etc.

		Peacetime Allowance	*War* [illegible]
Pattern 475	Neil Robertson	3 per cent. of peace-time complement	8 per cent. [illegible] complement
	War Office Type	2 per cent. of peace-time complement	4 per cent. [illegible] complement

[illegible] Class [illegible] Medical [illegible] 4 [illegible] satisfaction of the [illegible] War Office Type [illegible] light [illegible] sick bay [illegible] suitable.

[illegible]

		Peacetime Allowance	*War* [illegible]
[illegible]	Neil Robertson	5 per cent. of peace-time complement	11 per cent. [illegible] complement
	War Office Type	Nil	Nil

3. [illegible] adjust the numbers [illegible] War Office [illegible] complement [illegible] Supply [illegible] should [illegible]

4. [illegible] 2,000 tons [illegible] War Office type [illegible]

5. [illegible] should be amended.

(*N.S.O. Chatham—N.S.E. M. 3157X dated 29 Apr. 1946.*)

(*A.F.O. 6441/42* [illegible] *is cancelled.*)

1551.—B.R. 1750A—Pulheems—A System of Medical Classification for the Fighting Services—Naval Supplementary Pamphlet—Issue

(M.O.G. 40994/46.—25 Apr. 1947.)

Notes for guidance in the application of the Pulheems system of medical classification to the Royal Navy are now available and will be issued as B.R. 1750A.

2. All medical officers and drafting authorities should possess a copy of these notes for use with B.R. 1750. At home copies of the pamphlet may be obtained on demand from the Superintending Naval Store Officer, R.N. Store Depot, Fleeden Road, Park Royal, London, N.W.10, and abroad from the appropriate distributing authorities.

(A.F.O. 6753/46.)

1596.—Eyesight Standards for Men
(N. 7262/46.—2 May, 1947.)

A F O 1924/38 is [illegible]

APPENDIX

Amend [illegible] following table. Add new category — [illegible]

	[illegible]		[illegible] engagement Standard		Standard in [illegible] Period	[illegible]	[illegible]
	Distant	[illegible]	Distant	Near			
[illegible]	6/12 6/12 [illegible]	[illegible]	6/18 both [illegible] together [illegible] eye not less than 6/36	D 0·6	The cases of ratings whose vision falls below the engagement standard are to be referred to the Admiralty for decision	I	[illegible]
Writers, Stores ratings, Stewards, Cooks	6/60 6/60 glasses allowed to correct to 6/9 [illegible]	[illegible]	6/60 6/60 with glasses 6/12 6/12 at least	D–0·6 with glasses	The cases of ratings whose vision falls below the re-engagement standard are to be referred to the Admiralty for decision	III	As for Sick Berth Staff
Sick Berth Staff	6/60 6/60 glasses allowed to correct to 6/9 [illegible]	D–0·6 with glasses	6/60 6/60 with glasses 6/12 6/12 at least	D 0·6 with glasses	The cases of ratings whose vision falls below the re-engagement standard are to be referred to the Admiralty for decision	II	A high degree of [illegible] (i.e. in excess of 1·5 D) [illegible] or a gross defect of [illegible] vision disqualifies for [illegible] Glasses may be worn [illegible]
Air Mechanics	6/60 6/60 glasses allowed to correct to 6/9 EF	[illegible]	6/60 6/60 with glasses not less than 6/12 6/12 at least	D–0·6	The cases of ratings whose vision falls below the re-engagement standard are to be referred to the Admiralty for decision	III	As for Air Artificer
[illegible] Electricians Mate	6/60 6/60 glasses allowed to correct to 6/9 EE	D 0·6	6/60 6/60 with glasses not less than 6/12 6/12 at least	D–0·6		III	As for Air Artificer

(A F O 1924/38.)

1606.—Dope and Paint Spraying—Precautions

(N.M.D.C. 59743/46.—2 Mar. 1947.)

All [illegible] (naval or civilian) employed on doping work or in M.T. paint shops in [illegible] establishments are to have a quarterly medical inspection irrespective [illegible] whether the work is carried out in enclosed dope shops or not.

2. The danger of inhalation of fumes is often not fully appreciated, and [illegible] poisoning and fatalities may occur if strict precautions are not enforced.

General [illegible] possessed by most solvents used in dope and paint spraying are symptoms [illegible] feeling of intoxication, headache and [illegible] which may lead to [illegible]. Toxic symptoms which may lead to fatal [illegible] include anaemia, [illegible] kidney [illegible] paralysis and loss of vision.

3. *Means of prevention of symptoms.*—(a) All doping and paint spraying is to be done in a properly constructed dope shop designed for the purpose, except in the circumstances [illegible] sub-paragraph 3 (g) below.

(b) *Efficient ventilation.*—The air of a room used for doping should be maintained at a temperature of 68 deg.—70 deg. F. and the air should be capable of being changed thirty times per hour.

Mechanical ventilation is necessary, with the extracting fan [illegible] the floor on one side and the air inlets about ten feet above the floor on the opposite side of the room and with a total area [illegible] not less than [illegible] the extracting openings. Slowing of the extract fans or blocking the air inlets should not be permitted.

Heating should be effected by means of hot water or steam pipes and [illegible] close to the air inlets.

To lessen the danger from fumes, personnel should work back from the [illegible] the air inlet while applying dope.

The efficiency of the ventilation may be tested by [illegible] smoke [illegible] S.1210, supplies of which will be issued on demand addressed to the R.N. Stores Depot, Plender Road, Park Royal, London, N.W.10, should be [illegible]

(c) *Alteration of work.*—If possible personnel should not be employed continuously on doping but should be transferred periodically to other work, [illegible]

(d) *Special issue of milk or cocoa and bread and butter.*—A special meal consisting of milk [illegible] and a slice of bread and butter is to be provided daily for all personnel—

(i) employed on dope spraying and other doping work or

(ii) employed in M.T. paint shops at stations where the composition of the paint used and the conditions under which paint spraying is carried out are, in the opinion of the commanding officer, prejudicial to the health of the personnel concerned;

(iii) employed in dope stores or handling dope containers.

For this purpose a sum not exceeding 2d. or the current price of a pint of milk (whichever is the greater) can be expended from public funds for each meal. Bills for charges incurred up to the maximum amount allowed, supported by certificate signed by the Commanding Officer stating the number of meals issued, will be paid by the supply officer and should be charged to N.T. 16a.

In establishments where [illegible] present supplied [illegible] the personnel and [illegible] this arrangement [illegible] cost does not exceed the amount shown (Ministry of Food instructions [illegible] 3½ pints [illegible] milk per head per week to be supplied [illegible]

This meal should in no circumstances be consumed in the room where doping is carried out.

(e) *Dope masks.*—All personnel should wear the Air Ministry type of dope mask while spraying.

(f) *Periodic medical inspections.*—At the routine quarterly inspection of dope workers the medical officer will [illegible] any changes in the worker's physical condition, and if such b[illegible] steps to remove the w[illegible] work or arrange to keep [illegible]

(g) Small repairs [illegible] finish on aircraft which [illegible] impossible to transfer to a dope shop may [illegible] the open air or in a well [illegible] when weather conditions are suitable. It is essential, however, that [illegible] doping or painting operations are carried out all the above-mentioned precautions to avoid endangering the health of the operatives must be observed.

While such doping is in progress other ratings are not to be working in the vicinity unless they take the necessary precautions as for doping. These regulations apply irrespective of the method of application of the dope, i.e. spray or brush, etc.

4. All cases developing symptoms of poisoning are to be reported to the Medical Director General. The report should contain a brief summary of the signs, symptoms and the circumstances attending each case.

5. So far as civilian personnel employed in Great Britain or Northern Ireland are concerned, in addition to the above instructions all relevant statutory provisions of the Factories Act (e.g. Sections 47, 48 and 59) and related regulations (e.g. the Cellulose Solutions Regulations, 1934, and the Painting of Vehicles Regulations, 1926) are also to be observed where appropriate.

(A.F.O. 3470/45 is cancelled.)

1610.—Ratings—"Hostilities Only"—Transfer to Regular Engagements
(N. 7262/46.—2 May, 1947.)

A.F.O. [illegible] to be amended as follows:—
Appendix II. Visual Standards.
Visual [illegible] indicated in following table.

	Standard for men under 23		Standard for men aged 23 and over		Colour Vision	Remarks
	Distant	Near	Distant	Near		
[illegible]	[illegible]	D. 0.5	6/12 both eyes together worse eye not less than 6/24	D. 0.6	I	On entry hypermetropia present in [illegible] should not exceed:—Hypermetropia [illegible] dioptres. Simple hypermetropic astigmatism [illegible] dioptres. Compound hypermetropic astigmatism [illegible] dioptres in the meridian of greater error of which not more than 1.0 dioptre [illegible] astigmatism. Fields of vision to be normal (confrontation test).
[illegible]	[illegible]	D. 0.8	6/18 both eyes together worse eye not less than 6/36	D. 0.6	II*	A high degree of hypermetropia (i.e. in excess of 5.0 dioptres) disqualifies for entry. Fields of vision to be normal (confrontation test).
Sick Berth Ratings	6/60 6/60 glasses allowed to correct to 6/9 [illegible]	D. 0.[illegible] with glasses	6/60 6/60 with glasses 6/12 6/12 at least	D. 0.6 with glasses	II	A high degree of hypermetropia (i.e. in excess of 5.0 dioptres) or a gross defect of field of vision disqualifies for entry. Glasses may be worn on duty.
Writer, Stores Ratings, [illegible]	[illegible] 6/60 glasses allowed to correct to 6/9 [illegible]	D. 0.8 with glasses	6/60 6/60 with glasses 6/12 6/12 at least	D. 0.6 with glasses	III	As for Sick Berth Staff
[illegible]	6/60 6/60 glasses allowed to correct to 6/9 [illegible]	[illegible]	6/60 6/60 with glasses 6/12 6/12 at least	D. 0.6	III	As for Air Artificer
[illegible] Electrical [illegible] Mates	6/60 6/60 glasses allowed to correct to 6/9 [illegible]	D. 0.6	6/60 6/60 with glasses 6/12 6/12 at least	D. 0.6	III	As for E.R.A.

(A.F.O. 362/45.)

1611.—Sick Berth Petty Officers' Efficiency Medal

(N. 4580/47.—2 May, 1946.)

The Sick Berth Petty Officers' Efficiency Medal for 1946 has been [illegible] Sick Berth Petty Officer James Duncan, D/MX.57251.

2. Sick Berth Petty Officers of the Devonport Port Division are to be recommended for the award of the medal in 1948 for their services during 1947.

3. The method of forwarding recommendations is published in the Appendix to the Navy List, page [illegible] of the December, 1946 edition.

4. It is not practicable under present conditions for the medal to be struck in [illegible] and it has been decided to issue a bronze medal [illegible] but [illegible] entitled to gold under present conditions.

1697.—Pulheems System of Medical Classification for the Fighting Services

(M.D.G. 40934/46.—9 May, 1947.)

Medical classification of all serving personnel and new entries under the Pulheems system is to be carried out by the medical officers of ships and establishments as from the date of this Order and should be completed by 31st December, 1947.

2. B.R. 1750 contains a general description of the Pulheems system and has already been issued. The Naval Supplementary Pamphlet which is referred to in A.F.O. 6793/46 [illegible] for distribution as B.R. 1750A. At home copies of the pamphlet may be [illegible] demand from the Superintending Naval Store Officer, R.N. Store Depot, [illegible] Road, Park Royal, London, N.W.10 and abroad from the appropriate distributing [illegible].

3. Medical assessments under Pulheems will be recorded as described in B.R. 1750A [illegible] Numbers only (omitting assessments of Qualities "M" and "S") will be [illegible] Pay Books. Forms S. 416B for recording the full assessment are to be [illegible] page [illegible] the medical history sheet with gum along the top margin of the [illegible]. Rubber stamps will be used for recording in pay books.

4. Initial supplies of the forms referred to in paragraph 3 will be made without [illegible] from the printers. The rubber stamps will also be supplied [illegible] available.

5. It [illegible] that where large numbers of men are involved it may not be possible [illegible] complete the full medical examination. Under these circumstances a provisional [illegible] of "P" may be made based on the existing medical category as [illegible] the following table. In any case where this is done the notation "Provisional" will be made [illegible] both the pay book and the medical history sheet. The provisional assessment [illegible] by a full medical examination at the earliest opportunity.

Officers

Present Grading	*Assessment under Pulheems*
Nav 1	P 1 and P 2
Nav 2	P 3 and P 6
Nav 3	
Nav 4	P 7
Nav 5	

Ratings

Present Grading	*Assessment under Pulheems*
Category 1	P 1 and P 2
Category 2	P 3
Category 3	P 7

Royal Marines

Present Grading	*Assessment under* PULHEEMS
R.M. I	P 1
R.M. II	P 2
R.M. III	P 3
R.M. IV	P 3 or 7
R.M. V	P 8

4. The assessment under PULHEEMS will not replace the present system of medical grading until such time as further orders are promulgated.

(B.R. 1750 and B.R. 1750A.)
(A.F.O. 273/46, A.F.Os. 900/45, 622/46, 6793/46 and 1551/47.)

1871.—Dental Treatment and Prosthesis.—General Conditions Governing

(M.D.C. 15413/47.—23 May, 1947.)

SECTION I.—DENTAL TREATMENT

Entitlement

Necessary operative dental treatment is allowable at the public expense to the following personnel:—

R.N. and R.M. active service personnel.
Officers and ratings of the W.R.N.S.
R.N. and R.M. Officers retired who are employed on full salary on inspection, research, design, experimental, ordnance, pressure, defence duties, etc.
Personnel of the Reserve Forces during periods of service or while under training.
The permanent staff of the R.N.V.R.
Members of R.N. Shore Signal and Wireless Service.
Royal Marine Police.
Pensioner Recruiters and other pensioners serving under continuous service engagements or R.M. enlistments.
Members of the R.N. Canteen Service entered as ratings in the R.N.
Officers and members of the V.A.D.
Members of the Q.A.R.N.N.S. and Reserve Nursing Service provided dental treatment is undertaken at Naval, Army or Air Force dental centres and that no payment from public funds is involved.

2. Except as allowed for in paragraph 3, only emergency dental treatment for the relief of pain is allowable at the public expense to the following:

Personnel serving temporary agreements, e.g., T.124.
Civilian personnel engaged on T.N.G.C. Articles.
Mercantile Marine personnel and civilian N.A.A.F.I. canteen staff at isolated bases where facilities for dental treatment by civilian dental surgeons are unobtainable.
Civilians employed under the Admiralty and not borne on the books of H.M. Ships.
Pensioners serving in a civilian capacity.
Native servants.

3. Necessary dental treatment is allowable at the public expense to remedy the effect of an injury to the teeth or jaws suffered as a result of an accident directly attributable to the Service, provided such injury is reported at the time of its occurrence and that satisfactory evidence is produced. The patient will be liable for the cost of any additional treatment undertaken other than that necessitated by the injury (see paragraphs 40 and 49).

4. The following are *not* entitled to dental treatment at public expense:—

Wives and families of naval personnel.
Officers on the Retired List (except as provided for in paragraph 1).
Officers on half pay or unemployed pay.

5 The regulations [illegible] the treatment of officers [illegible] in King's Regulations and Admiralty Instructions

Reciprocal Dental Arrangements Between the Navy [illegible] Force

6 Dental treatment may be rendered to Army and R A F [illegible] dental officers where dental treatment by an Army or R A F dental [illegible] available provided that naval requirements are not interfered with and [illegible] employment of additional staff is not entailed Similarly where no naval dental [illegible] available naval personnel may be afforded necessary treatment at Army or R A F dental centres under the same conditions

No financial adjustment will be made between the Admiralty War Office and Air Ministry in respect of treatment afforded by the dental officers of one Service to personnel of the other two Services provided the patient is entitled under existing regulations to receive the treatment at the public expense

(i) *Naval Personnel*—Naval personnel (other than those seconded lent or attached to the Army or Royal Air Force) when applying for treatment at any Army or Air Force dental centre should be accompanied by Form S 3t which should be issued by the Commanding Officer on the recommendation of the naval medical officer (if one is borne) On completion of the work the form will be returned to the Commanding Officer of the ship or establishment to which the patient belongs for transmission by him to the appropriate filing centre as shown in current A F Os

(ii) *Army Personnel*—Army personnel (other than those seconded or lent to the Royal Navy) when applying for treatment by a naval dental officer will be accompanied by a written request in the case of officers or in the case of warrant officers non-commissioned officers and men by Army Form B 256 Treatment may also be given to personnel absent from a unit on leave etc on production of sufficient evidence of identity

On completion of the treatment particulars on Form M 228 should be sent to the patient's Commanding Officer by the naval dental officer

In cases where prosthetic work is required Form M 234 should be completed by the naval dental officer and forwarded to the patient's Commanding Officer for approval before the work is commenced

(iii) *Air Force personnel*—Air Force personnel (other than those seconded or lent to the Royal Navy) when applying for treatment by a naval dental officer will be accompanied by Air Ministry Form 632 This form showing particulars of the treatment given should be returned by the naval dental officer to the patient's Commanding Officer Treatment may be given to personnel absent from a unit on leave etc on production of sufficient evidence of identity

In cases where prosthetic work is required Air Ministry Form 632 should be forwarded to the patient's Commanding Officer for approval before the treatment is commenced On completion of the work the naval dental officer should complete Section 7 and return the form to the patient's Commanding Officer

Dominion Naval Personnel

7 Dominion personnel serving with the Royal Navy on an interchange basis are entitled to dental treatment at the public expense The cost however may be recoverable from the Government concerned in respect of other dominion personnel

Details of the treatment afforded showing the appropriate fee under the current Admiralty scale (vide paragraph 38 (d)) are to be entered on Form M 228 in each case Completed forms M 228 are to be forwarded monthly to the Medical Director General of the Navy together with a nominal list in duplicate

Allied Naval Personnel

8 During a national emergency on written request being received from their Commanding Officer personnel of allied navies are to be afforded the same facilities as Royal Naval personnel

Dental officers rendering such treatment are to forward monthly reports to the

Medical [illegible] paragraph 7 above [illegible] the subject of a separ[illegible] list.

[illegible] Immediately Prior [illegible]

9. If it is found that [illegible] shortly to be discharged [illegible] extensive surgical treatment necessitating the supply [illegible] efficiency [illegible] necessary hospital treatment.

SECTION II. [illegible]

[illegible]

10. [illegible] Article 1697 (1) [illegible] Articles 1908 and 1[illegible] [illegible]

[illegible]

(c) [illegible] not due to the [illegible]

14. [illegible] rated as ratings in H.M. [illegible] of dentures [illegible] mastication [illegible] funds [illegible] may be made [illegible] M 234 [illegible] Admiralty [illegible] para. 38 (c)) and forward [illegible]

15. [illegible] H.M. [illegible] entitled to the repair [illegible] provided the [illegible]

16. *Officers* are not entitled to the supply, repair [illegible] (except as provided for under para. 18).

(B) *Application for the Supply, Replacement* [illegible] *Public Expense—* [illegible]

17. Form M 234, *Supply of Dentures*, is to be used [illegible] all applications [illegible] at the public expense [illegible] dental surgeons [illegible] Section III. Applications should not be [illegible] can be proceeded with [illegible] as to the rating's eligibility should be recorded by the [illegible] Form M 239 to be attached [illegible] the rating's Naval Pay [illegible] Book (S 43A) as soon as [illegible] e.g., on completion [illegible] verification of the rating's entitlement under Section II (A) above. A further notation should be made on Form M 239 when the supply, etc., is effected. (See paragraph 28.)

At naval dental centres where dental [illegible] established the issue of Form M 234 may be dispensed with provided:—

(a) That the senior dental surgeon is satisfied as to the rating's eligibility for the gratuitous issue.

(b) That the supply, etc., can be effected before the rating leaves the establishment.

(c) That a receipt for the supply [illegible] is given on Form M 228.

18. Except as indicated in paragraph 17 above, authority for the supply, etc., will [illegible] the Commanding Officer of the ship or establishment in which the rating is [illegible] provided:—

(a) That the supply, etc., is recommended by a Navy, Army or Air Force dental officer [illegible] a naval medical officer if a dental officer is not available.

(b) That the patient is eligible under the foregoing regulations.

When the application is made by a naval dental officer, authority for the supply [illegible] given by the Commanding Officer of the ship or establishment [illegible] dental [illegible] delay.

When doubt exists as to the rating's eligibility the Commanding Officer should [illegible] the application to the Command Dental Surgeon for approval.

19. [illegible] *employed in the Admiralty, H.M. Dockyards, or other Naval Establishments.* Applications [illegible] Dockyard Regulations, Article 1901 and [illegible] supply, repair or replacement at the public expense of dentures [illegible] attributable to the Service (*vide* paragraph 18) should be submitted [illegible] Superintendent [illegible] the patient [illegible] naval dental officer [illegible] in the vicinity [illegible] report. The report should show the extent of the [illegible] the estimated cost according to the current Admiralty Scale [illegible] paragraph 38 (c)). [illegible] dental work necessary [illegible] consequence [illegible] report [illegible] forwarded to the Admiralty for approval, except [illegible] Dock [illegible]

[illegible] that [illegible] should be [illegible] dental [illegible] National [illegible] Section [illegible]

[illegible] Manuals [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] the [illegible] [illegible] [illegible] [illegible] issued [illegible]

20. [illegible] obtain [illegible] [illegible] officer [illegible] paragraphs [illegible]

21. Whenever [illegible] [illegible] [illegible] accounts [illegible] adjustment [illegible]

(C) [illegible] *and Repo* [illegible] *Public E* [illegible]

22. Lab [illegible] M slips and [illegible] utilized in [illegible] Dental officer [illegible] [illegible] [illegible] the [illegible] Dental Surgery. When [illegible] Service [illegible] [illegible] M 234 is [illegible] identification.

23. [illegible] from [illegible] laboratory [illegible] instruction [illegible] respective [illegible] records.

24. In the [illegible] [illegible] [illegible] dental officer [illegible] [illegible] determined [illegible]

[illegible] dental [illegible] possible [illegible] [illegible] person [illegible]

25. [illegible] health [illegible] [illegible] [illegible] [illegible] [illegible]

26. At [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

27. [illegible] [illegible] [illegible]

[illegible] [illegible]

28. [illegible]

expens [illegible] Book [illegible] S 43A) [illegible]

i) [illegible] rotation [illegible] naval [illegible] of each [illegible] Form M 239 [illegible] page 15 or 17 [illegible] Book [illegible]

ii) [illegible] the [illegible] details of [illegible] M 239 [illegible] ruled [illegible] Book.

iii) [illegible]

[illegible]

[illegible]

[illegible] M 234) [illegible]

[illegible] paragraph 38 (c) [illegible]

[illegible] the [illegible]

[illegible]

[illegible] M 234) [illegible]

[illegible] receipt [illegible] Officer [illegible] rating [illegible] exact [illegible] from the [illegible] the necessary [illegible] the ship's ledger.

35 [illegible] or in the [illegible] (under Section II [illegible] in the cash [illegible] the authority [illegible] the number [illegible]

[illegible]

36 [illegible] [illegible] supply [illegible] of the repair [illegible] Admiralty [illegible] 48 [illegible]

(i) [illegible]

(ii) [illegible]

(iii) [illegible] (Form M 234) [illegible] the work.

This [illegible] not [illegible] for any part of the work.

[illegible]

37 Members of [illegible] Naval Nursing Service and [illegible] Nursing Service [illegible] as provided [illegible] paragraph [illegible]

Where [illegible] involve [illegible] may obtain [illegible] Scale of fees [illegible] paragraph 48 [illegible] are essential [illegible]

SECTION III [illegible]

38 Officers [illegible] expense [illegible] treatment [illegible]

(a) [illegible]

(b) [illegible]

(c) The [illegible] Admiralty [illegible] Regulations.

39 [illegible] Officer [illegible] denture [illegible] cost of the [illegible]

40 If further [illegible] of the cost [illegible] Commanding Officer [illegible]

[illegible] obtained [illegible] Service [illegible] establishment [illegible]

41 [illegible]

[illegible]

[illegible] not available [illegible] civilian prac[illegible] the Admiralty [illegible] with the [illegible]

[illegible] laid [illegible] Director [illegible] Navy [illegible]

44 [illegible] at the [illegible] 1934 [illegible]

[illegible]

[illegible]

[illegible]

1 1 (5 2198 46 [illegible]

[illegible] 1606 45 2238 4[illegible] 5441 45 [illegible] 45

[illegible]

1574 Vision Standard—"Hostilities Only" Ratings—General Instructions

(M.D.G. 15413 47.—23 May, 1947.)

[illegible] standards of vision required on entry [illegible] naval ratings and other ranks Royal [illegible] hostilities only are based on those issued by the Ministry of Labour and

[illegible]

ndered [illegible] a after entry to be better qualified [illegible] other rating [illegible] ce

[illegible] who has vision just below standard [illegible] be [illegible]

[illegible] standard [illegible]

[illegible] of the lateral vision whether [illegible] further disability under the [illegible]

[illegible] (This is not tested by the National [illegible]) [illegible] the [illegible] for which the man [illegible]

[illegible] Although the high standard [illegible] not required by other ratings [illegible] the [illegible] Grade III of [illegible] on the findings of the [illegible] arranging [illegible] involve [illegible] which the man needs for [illegible] might [illegible] the connecting up of coloured leads [illegible] under [illegible] markings on instruments [illegible]

[illegible] table for men who are required [illegible]

Rating	[illegible] *Standard*	*Colour* [illegible]
[illegible]		
[illegible] (including Landing Craft Signalmen)	1	I
[illegible] Defence [illegible]	3	I
[illegible]		
[illegible] Service	2 (L)	I
[illegible] ratings	4	III
[illegible]	3	III
Note—Radar ratings [illegible] drafted to small ships [illegible] look out duties must have [illegible] standard 2 [illegible] Vision Grade I.)		
[illegible]	3 (L)	I
[illegible]	4 (L)	[illegible] III
[illegible]	6	[illegible] III
[illegible]	4 (L)	[illegible] III
[illegible] (M.St	4	III
[illegible] (M.) [illegible] (J)	6	III
[illegible]	6	III
[illegible]	7 (L)	I
[illegible] standard [illegible] Service.)		
[illegible]		
With [illegible]	4 (L)	III
[illegible]	7 (L)	III
[illegible]		
[illegible]	4 (L)	III
[illegible]	4 (L)	III
[illegible]	1	III
[illegible]	1	III

[illegible]	[illegible]	[illegible]
[illegible]		
General Service —		
Engine Room Artificers	4	III
Other Artificers	1	III
Motor Mechanics	1	III
Ordnance Mechanics Electrical Mechanics Engine Mechanics Radio Mechanics	1	III
Air Fitters Air Mechanics } all types	1	III
Shore Service only		
All the above ratings	[illegible]	III
Special Repair Ratings (D)	[illegible]	III
Communication and Miscellaneous R[illegible]		
General Service —		
Artisans Shipwrights Telegraphists Coders Signalmen A/M Signalmen T P Writers S B Attendents Supply Ratings Cooks Stewards	[illegible]	III
(*Note* Telegraphists [illegible] small ships in which they will be required for V[illegible] must have Vision standard 2 (I) and [illegible].)		
Shore Service —		
All the above ratings	[illegible]	III
Royal Marines —		
General Service	[illegible]	III
(*Note*.—A proportion of [illegible] at present being accepted for General Service.)		
R M Tradesmen R M Bandsmen	4	III
R M Engineers	4	III

(A.F.Os 3965/43, 395/44, 935/44 and 4076/44 are cancelled.)

1662.—Medical Organization for Action

Emergency Operating Stations and First Aid Posts

(M.D.G. 15413/47.—23 May, 1947.)

As the result of war experience some modification is required in the scheme of medical organization for action.

2. Experience has proved the necessity for as great a degree of decentralization of medical and first aid personnel, stores and equipment as possible.

3. In addition the necessity for an emergency operating station with easy access for stretchers for the treatment of wounded is essential.

[illegible]

(5) The ap[illegible] manner e.g. [illegible] was

(6) The [illegible] obstruction [illegible] in the vari[illegible] as sufficient [illegible] all [illegible]

(7) The f[illegible] excess [illegible] in mind th[illegible] should be p[illegible] [illegible]

Adh[illegible]
Ban[illegible]
Bandage[illegible]
Absorbent [illegible]
Gau[illegible]
Lint [illegible]
Saf[illegible]
Anti[illegible]

Spirits [illegible]
Morphia [illegible] in 1 oz. rubber cap bottles
Syringe [illegible] of morphine hydrochloride
Hypodermic [illegible] needles
Splints [illegible] malleable metal for splints
Scissors [illegible] Artery forceps
Scalpel
[illegible]
[illegible] for spare [illegible]
First [illegible] Shell [illegible]
Sterile [illegible]
Ligatures [illegible]
Labels (identification) [illegible]
Torch
Medical comforts Blankets
Hot water bottles, [illegible] bowls, cups, [illegible]
Blood transfusion equipment

One or more of the emergency dressing cases should also [illegible] is a reserve store of dressings.

8. *Equipment for First Aid at Action Stations.*—In addition to the equipment in [illegible] containers are available and can be fitted to bulkheads in convenient places such as gun turrets, gun houses, bridge [illegible] engine and boiler rooms. [illegible] A breakable seal marked with a red cross and the words "First Aid Stores—for [illegible] only," should prevent its being opened and used for any other purpose by [illegible] persons. A weekly check should be made.

First aid haversacks may also be distributed (see K.R. & A.I., Article **1395**, Clause [illegible] (d)) but the contents of haversacks are liable to deteriorate and may more easily be lost, although these can equally well be sealed.

9. *Personnel.*—The question of how many first aid posts are to be established in a ship will be affected by the number of staff available to man the various posts.

The distribution of the medical personnel should be so arranged that each post has a sick berth rating or at least a specially qualified first aid worker, together with a less skilled assistant. The medical officers should be [illegible] distributed at the more important [illegible].

It is important that the Principal Medical Officer should not be immobilized at any [illegible] point, but should be free to move about as necessary, supervising and adjusting the [illegible] changes in the situation as they arise.

10. *First Aid.*—All officers and men should receive instruction in first aid, officers and [illegible] being given more advanced instruction including the technique of hypodermic [illegible].

[illegible] principles can be taught during [illegible] & R.T., such as stretcher drill, including [illegible] the Neil Robertson, artificial respiration, use of first field dressings, precautions [illegible] limbs [illegible] handling, and its limitations.

11. *Organization.*—(1) *During Action.*—(a) Casualties occurring in the immediate [illegible] are readily dealt with.

(b) [illegible] that occur in situations beyond easy reach of [illegible] are staffed in the [illegible] simple first aid rendered by personnel instructed in first-aid.

[illegible] efforts [illegible] made from the [illegible] to render more skilled [illegible] cases.

(c) [illegible] possible the wounded are taken on stretchers to [illegible] where they [illegible] further treatment.

[illegible] should be made to take personnel [illegible] except [illegible] medical officer.

[illegible] *(a)* The Senior Medical Officer should review the situation and [illegible] the [illegible] station shall be set up.

[illegible] be [illegible] and [illegible] dispatched [illegible]

Alternative [illegible] will [illegible] in accordance with K.R. & A.I. Article **1395,** Clause [illegible] and (*f*) [illegible] appear in the ship's orders.

(3) *Resuscitation*.—The [illegible] which will occupy a considerable [illegible] shock treatment, the provision of heat, [illegible] in which blood [illegible]. The majority of severe casualties will probably be unfit for [illegible] treatment until [illegible] hours have elapsed.

(4) *Drills*.—It is very important that adequate drills shall [illegible] to ensure that every one in the ship's company knows the positions of the [illegible] F.A.P.s and his duties in the event of casualties.

Experience has shown that a large number of men may be wounded at the same time, and drills must be designed to test the organisation for competing with numerous casualties in one area simultaneously. The arrangements for transport of casualties to the F.A.P.s and also in the event of abandoning ship should be an executive commitment if possible, arrangements being made between the Senior Medical Officer and the Executive Officer.

(5) *Stretchers*.—There have been numerous instances of failure to use stretchers and thereby much unnecessary injury and suffering to wounded personnel has been caused. It is a natural reaction in times of stress for a man to be taken for medical attention by the quickest [illegible] to the correct method. Drills alone can impress on the ship's company that [illegible] patients and those whose injuries are not evident should [illegible] handled only as a last resort. The [illegible] types of stretcher:—

(i) Pattern 475. Neil Robertson type.

(ii) War Office type.

For allowances—see pertinent establishments of medical stores.

These should be distributed widely throughout the ship at F.A.P.s and elsewhere, and should be properly secured in positions allocated for the purpose.

(6) *[illegible] Discs*.—Sorting and appropriate labelling of cases is part of the organisation for dealing with casualties, [illegible] of great importance in this connection. [illegible] regard to wearing these articles has been the cause of much difficulty [illegible] unidentified remains [illegible].

Discs should be worn at all times and [illegible] Division. They are best [illegible] next to the skin on a [illegible] enough to prevent [illegible].

[illegible] should be stamped on his identity disc.

(7) *Anti-Flash Gear*.—Anti-flash helmets, goggles, masks and gloves are provided for the whole complement. Many cases of burns have occurred on the face and arms which would have been avoided if anti-flash gear had been worn. Protection is afforded by ensuring that no portion of the body is exposed, the sleeves rolled down and the ends of the trousers tucked into the socks.

(8) *Emergency Lighting*.—A [illegible] is required for medical parties [illegible] Pattern 16644 and the light Pattern 17809 [illegible] light [illegible] work. A new [illegible] light is now issued (Pattern 12081). Allowances of [illegible] in the pertinent establishments of medical stores.

(9) *Water*.—An ample supply of [illegible] importance for the wounded. [illegible] for both drinking, preparation [illegible] and for surgical [illegible] water bottles [illegible] should be [illegible].

[illegible]

([illegible] 725 45 7066 45 [illegible] D 4 45 [illegible])

1883 Inoculation—Completion of Courses

(M.D.C. 1541.5 47 23 May 1947.)

[illegible] inoculation [illegible] cannot be [illegible] is to be made so that [illegible] The date when the next inoculation is due [illegible] Details are to be entered in the medical list [illegible] and the particulars [illegible] 43A [illegible]

[illegible] made in the Pay Book S 43A [illegible]

[illegible] medical [illegible] when the medical list [illegible]

(See 1310 47, 1500 47, 1885 47 and 1886 47)

(I F O 166 44 is cancelled)

1884 —Suppressive Treatment of Malaria

(M.D.G. 1541.3 47 23 May 1947.)

[illegible] treatment is an emergency procedure which should [illegible] area [illegible] of malaria [illegible] should be [illegible] such as [illegible] quinine [illegible]

[illegible]

[illegible]

1588.—Protection against Typhoid Fever. [illegible] of Tetanus Toxoid

[illegible]

[illegible]

1417, [illegible] F.N. Medical [illegible]

[illegible]

Ship or establishment

Month ending

Type of vaccine

	Batch No and date	Nil	*	**	***	Total
First inoculation — Local reactions						
General reactions						
Second inoculation — Local reactions						
General reactions						
Totals						
[illegible] and remark						

10 Instructions for completing the return are as follows —

Local reactions —

- Nil — No signs
- * Area of inflammation and swelling not exceeding 5 sq cm
- ** Area of inflammation and swelling exceeding 5 sq cm
- *** Large area of inflammation swelling and lymphadenitis

General reactions —

- Nil — No symptoms
- * Headache and malaise Temperature normal
- ** Headache and malaise Temperature above normal but not exceeding 100° F
- *** Headache malaise and nausea etc Temperature exceeding 100° F Sick List

Batch number and date of vaccine is often omitted but importance of its inclusion is [illegible] particularly if the return shows an abnormal number of reactions.)

(K.R. and A.I. Art 1437.)
(A.F.O. 1883/47.)
(A.F.O. 7075/45 is cancelled.)

*1968 National Health Insurance—Maternity Benefit Revised Method of Claiming

(N.M. 9865/47.—30 May 1947.)

Consequent upon the cessation of prenatal allowances the procedure for claiming matter is [illegible] promulgated in A.F.O. 288/41 [illegible] procedure in [illegible] of that A.F.O. remain[illegible]

2. *Members of Approved Societies* [illegible] should apply [illegible] Approved Societies. Ratings and men [illegible] give [illegible] Approved Societies [illegible] membership number [illegible] application [illegible] on service [illegible] Approved Society [illegible] Secretary, Ministry [illegible] N.A.I.B., Newcastle-on-Tyne [illegible] official [illegible]

3. *Men who are not members of an Approved Society* [illegible] apply [illegible] benefit on Form S.1036 which is obtainable from [illegible] be forwarded to the Secretary, Ministry [illegible] N.A.I.B. [illegible] Tyne 3. Ratings are advised [illegible] make application direct should [illegible]

4. Claims for maternity benefit [illegible] takes place [illegible] Kingdom. If the claim is delayed [illegible] stated.

5. Form S.1036 has been reprinted [illegible] revised form which is to replace the old [illegible] from the [illegible] Royal Naval Store Depot, Park Royal [illegible] the fact that [illegible] S.1036 was reprinted the address of the Ministry of National Insurance has been [illegible] that shown in paragraph 2 above. [illegible] amended in manuscript.

(*A.F.Os. 4101/4? and 996/44 [illegible]*)

1976.—PULHEEMS System of Medical Classification for the Fighting Services
(M.D.G. 4[illegible]34/46.—30 May, 1947.)

Medical classification of all serving personnel and new entries under the PULHEEMS system is to be carried out by the medical officers of ships and establishments as from the date of this Order, and should be completed by 31st December, 1947.

2. B.R. 1790 contains a general description of the PULHEEMS system and has already been issued. [illegible] supplementary pamphlet which is referred to in A.F.O. 6793/46 is now ready for distribution as B.R. 1790A. At home, copies of the pamphlet may be obtained on demand from the Superintending Naval Store Officer, R.N. Store Depot, [illegible] Road, Park Royal, London, N.W.10, and abroad from the appropriate distributing authorities.

3. Medical assessments under PULHEEMS will be recorded as described in B.R. 1790A. The [illegible] (omitting assessments of Qualities "M" and "S") will be recorded in pay books. Forms S.446B for recording the full assessment are to be attached to page 4 of the medical history sheet [illegible] Rubber stamps [illegible] recording in pay books.

4. Initial supplies of the forms referred to in paragraph 3 will be [illegible] demand [illegible] from the printers. The rubber stamps will [illegible] supplied [illegible]

5. [illegible] complete the full medical [illegible] personnel [illegible] existing [illegible] will be [illegible] both the pay book and the medical history [illegible] personnel [illegible] appointment.

Offices

[illegible]

1990.—W.R.N.S. [illegible] Inoculation and Medical Examination [illegible] Overseas

([illegible] 1188/47.—30 May, 1947)

[illegible] W.R.N.S. [illegible]

2. [illegible]

3. [illegible] W.R.N.S. [illegible]

[illegible]

2048.—Pay and Allowance Regulations of the Royal Navy—Amendments to Chapter I (A.F.O. 3818/46)

(C.W. 63176/46—6 June, 1947)

[illegible] 42, 43 and 45 [illegible]

3. [illegible] acting [illegible] granted acting [illegible]

[illegible] 42 [illegible] 43 [illegible]

[illegible] 16 [illegible] 4713/46 [illegible]

[illegible] 6/10/46 [illegible]

2039.—Pay and Allowance Regulations of the Royal Navy—Amendments to Chapter II
(A.F.O. 5609/46)
(R.W. 8 June 1947.)

The following is to be substituted for the present Articles **42** and **43**:—

42. *Medical Officers.*

The following scale applies [illegible]:—

(i) Officers transferred to the [illegible] R.N. or to the permanent R.N.V.R. on or after 1st July, 1946.

(ii) Officers entered [illegible] the R.N. [illegible] permanent or temporary R.N.V.R. on or after 1st July, 1946.

(iii) Officers holding the substantive [illegible] rank of Surgeon Captain [illegible] R.N. or Surgeon Commander [illegible] R.N.V.R. [illegible] revised conditions [illegible] (A.F.O.s. 5423/46 and 1984/47).

Rank	*Daily rate*
Acting Surgeon Lieutenant	1 [illegible] 0
Surgeon Lieutenant on confirmation after 1 year from date of entry	1 8 0
at 2 years seniority	1 11 [illegible]
4	1 14 [illegible]
6	1 1[illegible]
Surgeon Lieutenant-Commander on promotion	[illegible]
[illegible]	[illegible] 1 [illegible]
4	[illegible]
8	2 1[illegible]
Surgeon Commander on promotion	2 18 [illegible]
after [illegible]	3 1 [illegible]
4	3 1 [illegible]
6	3 [illegible]
8	3 1[illegible]
Surgeon Captain on promotion	3 18 [illegible]
after [illegible]	3 18 [illegible]
4	4 1 [illegible]
6	4 [illegible]
8	4 [illegible]
Surgeon Rear-Admiral	[illegible]
Surgeon Vice-Admiral	[illegible] 15 [illegible]

Note.—Increment [illegible] R.N.V.R. [illegible] (see 59).

2. R.N. officers granted [illegible] hospital appointment [illegible] A.F.O. 5423/46 [illegible] Surgeon Lieutenant.

3. The following special [illegible] R.N. [illegible] the substantive rank of Surgeon [illegible] Commander on 30th June, 1946 [illegible] (See A.F.O. 5423/46.)

(a) *Officers* [illegible]

Surgeon [illegible] [illegible]

On promotion [illegible] | 1 8 [illegible]
On promotion [illegible] | 1 11 [illegible]
Surgeon [illegible] | 1 14 [illegible]
On promotion [illegible] | 2 0 [illegible]
On promotion [illegible]
Thereafter [illegible]

(b) *Officers* [illegible] 1946

Surgeon Lieutenant [illegible]

On promotion [illegible] | 2 14 0
On promotion [illegible] | 2 18 [illegible]
Thereafter [illegible]

(c) *Officers* [illegible] 1946

Surgeon Commander [illegible]

On promotion [illegible]
Thereafter [illegible]

[illegible] The following [illegible] holding the [illegible] on 30th June 1946 [illegible] 1946/47)

(a) *Officers holding* [illegible]

Surgeon Lieutenant [illegible]

On promotion to Acting [illegible] substantive [illegible]
Thereafter [illegible]

[illegible] rank of Surgeon Lieut [illegible] 1946

[illegible]

Surgeon [illegible] after 2 years [illegible]

[illegible] 2

Surgeon [illegible] Commander after 2 years [illegible]

Surgeon [illegible] Commander after 4 years [illegible]

Surgeon [illegible] after 6 years [illegible] 2 years [illegible]

On promoti[illegible]

Thereafter [illegible]

a *Officers [illegible] promoted [illegible] follows

(a) Offic[illegible] rank [illegible] that offi[illegible] 15th May 194[illegible] may [illegible] for the [illegible] standard [illegible] 67

(b) Officers [illegible] whilst holding [illegible] rate on the standard [illegible] 67

(c) Officers holding [illegible] Command [illegible]

43 *Dental Officers*

The following [illegible]

(i) Officers [illegible] R.N. [illegible] R.N.V.R. [illegible]

(ii) Officers [illegible] R.N.V.R. [illegible] 1946

(iii) Officers holding [illegible] R.N. [illegible] R.N.V.R. [illegible]

[illegible]

[illegible]

[illegible] (p. 59)

[illegible]

[illegible] 30th [illegible]

[illegible]

[illegible] 1856

[illegible]

[illegible]

[illegible]

[illegible]

2041.—Pay and Allowance Regulations of the Royal Navy. Schedule of those Regulations now Promulgated

(C.W.—8 June, 1947.)

Chapter I—Officers and Men. General Instructions	A.F.Os. 3818/46, [illegible] 6415/46 and 1238/47
Chapter II—Pay of Officers	A.F.Os. 5609/46, [illegible] 1088/47 and 2044/47

Chapter III [illegible] Allowances	A [illegible] 3819/46 and 6317/46
Chapter IV [illegible] Allowances payable in respect [illegible]	A F Os 4053/46 5611/46 and 6318/46
Chapter V [illegible] Mess Lodging Ration and [illegible] Allowances	A F Os 4662/46 7254/46 462a/47 925/47 and 1667/47
Chapter VIII [illegible] Ladies Maids Officers Flying [illegible] Pay Medical [illegible] Specialist Pay W R N S and Q A R N N S Allowances	A F Os 1296/47 and 2040/47
Chapter IX [illegible]	A F Os 5278/46 6319/46 6895/46 7256/46 and 1090/47
Chapter X Pay and Allowances of Retired [illegible]	A F Os 4908/46 and 7257/46
Chapter XI Pay and Allowances of Naval Ratings [illegible] W R N S [illegible] V A D	A F Os 3917/46 6347/46 6552/46 725/47 and 1902/47

(A F O 1297/47 is cancelled)

2088 —R N Medical Depot Huddersfield—Closing Down

(M D G 17730/47 —6 June 1947)

[illegible] R N Medical Depot Britannia Mills Colne Road Huddersfield has now closed [illegible]

[illegible] correspondence relating to supplies to and from that depot should be addressed to the Technical Assistant to M D G R N Medical Depot Risley near Warrington [illegible]

2120.—Amputation Cases—Procedure

(M D G 663 47 —13 June 1947)

[illegible] normally to be kept on full pay and allowances until the limb [illegible] fitted This is applicable to non attributable as well as attributable [illegible]

[illegible] should be transferred when the stump is healed to the Ministry of [illegible] nearest to the patient's home Arrangements for transfer should be [illegible] Superintendent of the Ministry of Pensions hospital and the fact [illegible] to the Medical Director General The Superintendent of the Ministry of Pensions hospital should be requested to inform the Medical Director General of the [illegible] Ministry of Pensions St James's Park London S W 1 when the limb has [illegible] and the patient is ready for surveying for invaliding The [illegible] will then be issued

3 The Medical Officer in charge of the hospital responsible for the transfer of the [illegible] the Ministry [illegible] hospital is responsible for informing the supply officer of [illegible] when the [illegible] for pay of the arrangements made also ensuring [illegible] when the man is sent on leave and becomes entitled to [illegible] allowances

[illegible] cases that [illegible] plicated by other disabilit[illegible] it is long [illegible] treatment [illegible] (A.F.O. 805/46) it however [illegible] exist which [illegible] in-patient hospital treatment the case [illegible] long term [illegible] ease if [illegible] able to the patient [illegible] hospital.

The Ministry of Pensions hospitals are as follows [illegible] sent to the hospitals marked*

Aylesbury	Ministry of Pensions Hospital Stoke Mandeville Aylesbury Bucks Telephone Aylesbury 900 Telegrams Hospens Aylesbury
Cosham	Queen Alexandra Hospital Cosham Portsmouth Hants Telephone Cosham 76078 9 Telegrams Hospens Cosham
Dublin	British Ministry of Pensions Hospital Leopardstown Park Blackrock Co Dublin Telephone Dun Laoghaire 84187 Telegrams Hospens Blackrock
*Edinburgh	Ministry of Pensions Hospital Edenhall Musselburgh Midlothian Telephone Musselburgh 46 Telegrams Hospens Musselburgh
Gateshead	Ministry of Pensions Hospital Dunston Hill Gateshead 11 Telephone Gateshead Dunston 84444 5 Telegrams Hospens Whickham
*Leeds	Ministry of Pensions Hospital Chapel Allerton Leeds 7 Telephone Leeds Chapeltown 41071 2
Liverpool	Ministry of Pensions (Childwall) Hospital Woolton Road Liverpool 16 Telephone Childwall 2238 9 Telegrams Hospens Liverpool
Llandaff	Ministry of Pensions Hospital Rookwood Llandaff Cardiff Telephone Llandaff 1027 8 Telegrams Hospens Cardiff
*Roehampton	Queen Mary's (Roehampton) Hospital Roehampton London S.W 15 Telephone Putney 6131 4 Telegrams Hospens [illegible] London
Taunton	†Musgrove Park Hospital Taunton Somerset Telephone Taunton 3862 Telegrams Hospens Taunton
Worcester	Ministry of Pensions Hospital Ronkswood Newtown Road Worcester Telephone Worcester 4335 Telegrams Hospens Worcester

†This hospital is administered by a joint management committee [illegible] of representatives of the Ministry of Pensions and the Somerset County Council.

(Instructions for R.N. Hospitals Art 406 and 588.)

(A.F.O. 805/46.)

(A.F.O. 1309/47 is cancelled.)

2124.—Vaccination and Inoculations for Persons Travelling to North West and Western Europe including Germany

(M.D.G. 15413/47.—13 June, 1947.)

Owing to the risks of disease, all persons proceeding to North West Europe and Western Europe, including Germany, in troopships based on or calling at ports in those areas are to be in possession of a medical certificate stating that they have been successfully vaccinated during the three years immediately preceding the date of departure from the United Kingdom and also inoculated against typhoid fever during the twelve months preceding the date of departure.

2. Re-vaccination should be carried out every three years and re-inoculation against typhoid fever yearly.

3. For naval personnel details of the vaccinations and inoculations are to be entered in the medical history sheets when these are available, and the particulars, together with the date, are to be entered in Form S.43A (Sailor's pay book and identity card) at the time when the injections are actually given. When time does not permit of this being done before departure, this should be effected at the first opportunity.

4. Departments arranging visits must ensure that individuals travelling comply with the above.

(A.F.O. 4278/46, 1883/47 and 1885/47.)
(A.F.O. 1886/47 is cancelled.)

†2127.—Q.A.R.N.N.S.—Matron-in-Chief—Appointment

(C.W. 12742/47.—13 June, 1947.)

Miss D. H. Franklin, M.B.E., R.R.C., is appointed Matron-in-Chief, Q.A.R.N.N.S., in succession to Miss M. Goodrich, R.R.C., to date 14th July, 1947.

(A.F.O. 3282/44 is cancelled.)

2260.—Form D 145—Medical Report on a Naval Rating when Found Unfit for further Active Service—Revision, January, 1947

(M.D.G. 5469?/46.—20 June, 1947.)

Attention of all concerned in the compilation and use of Invaliding Survey Report D. 145 is directed to the fact that the form revised in June, 1940, has been extensively revised in January, 1947.

2294.—Eyesight—Night Vision Testing—Establishments Detailed to carry out Tests—Provision of A.R.L. Adaptometers

(M.D.G. 4900/47.—17 June, 1947.)

It has been decided that night vision testing will be carried out only in the following establishments:—

H.M.S. "Excellent."
R.N. Gunnery School, Chatham.
H.M. Gunnery School, Devonport.
H.M.S. "Mercury."
H.M.S. "Raleigh."
H.M.S. "Impregnable."
H.M. Signal School, Chatham.
H.M. Signal School, Devonport.
Royal Marine Barracks at Eastney, Deal, Chatham and Plymouth.
Royal Naval Barracks at Portsmouth, Chatham and Devonport.
Royal Naval Hospitals at Haslar, Plymouth, Chatham, Port Edgar, Portland, Bermuda, Malta, Hong Kong and Combined Services Hospital, Trincomalee.
Central Air Medical Board.
Royal Naval Air Stations at Dale, Eglinton, St. Merryn, Donibristle, Hal Far, Malta.

[illegible]

2305.—W.R.N.S. Vision Standards

[M.D.G. [illegible]] [illegible] Jan. 1942

[illegible]

Standard 5 [illegible]

Standard 6 [illegible]

Standard 7 [illegible]

[illegible]

Vision Stand[illegible] [illegible] [illegible] include [illegible] [illegible] [illegible] tical value

It is not [illegible] [illegible] [illegible] and types of [illegible] shown [illegible] [illegible]

4 *Colour* [illegible] [illegible] [illegible] percentage of [illegible] [illegible] important that [illegible] [illegible] [illegible] include the [illegible] [illegible]

5 *M[illegible]* [illegible] —The foll[illegible] [illegible] the date of this Order

Range [illegible]	V[illegible] Standard 1
[illegible] operators	V[illegible] Standard 2
Radio Mechanic Writer (Pay) W/T (D F) Meteorological Airwomen	V[illegible] Standard 3
Cooks Hairdressers Quarters assistant Stewards Switchboard operators	V[illegible] Standard 6
All other categories	V[illegible] Standard 4

M I D[illegible] [illegible] worse eye not less than 6/60 correctable [illegible] the worse eye correcting to at least 6/24

[illegible] *Spectacles* —Th[illegible] [illegible] categories [illegible] 1187/43 is [illegible] for the [illegible]

[illegible] W R N S ratings [illegible] [illegible] would normally be [illegible] until the end of the [illegible] [illegible] are otherwise fit

All [illegible] [illegible] retention is [illegible] [illegible] duties where they [illegible]

[illegible] 1077
[illegible] 1187/43
([illegible] 1899/47 [illegible]ncelled)

2352.—Established Civilian Non Industrial Staff—Revised Arrangements for Appeal against Retirement on Medical Grounds

(C P 4891/47 —27 Jun 1947)

Consideration has been given to the arrangements to be followed when an Establishment Officer or a Civil Servant who is a member of the Federated Superannuation Scheme for Universities wishes to appeal against—

(a) Cancellation of appointment on medical grounds during probationary service or
(b) Retirement on medical grounds when he considers that his health does not incapacitate him for further service or
(c) Refusal to allow retirement on medical grounds when he considers that his health unfits him for further service

[illegible] had the right of appeal [illegible] subject [illegible] Treasury Medical Adviser [illegible]

[illegible] will be [illegible] Treasury Medical Adviser [illegible] medical board.

[illegible] the Treasury Medical Adviser [illegible] shall however be final [illegible]

[illegible]

OBITUARY

[illegible] Surgeon Rear-Admiral H. M. [illegible]

[illegible] Officer Commanding [illegible] 23rd May, 1947 [illegible] Royal Naval Medical Service [illegible]

[illegible] H. Whale [illegible] M.R.C.S., L.R.C.P. [illegible] the Naval Medical [illegible]

[illegible] H.M.H.S. [illegible]

[illegible] Royal Naval Hospital [illegible]

[illegible] daughter [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

HONOURS AND AWARDS

Knight Commander of the Order of the Bath

[illegible] H. St. C. Colson, C.B., C.B.E., M.B., B.S., F.R.C.S., [illegible]

Knight Commander of the Royal Victorian Order

[illegible] H. E. Y. White, C.V.O., O.B.E., M.D., F.R.C.S. [illegible]

Officer of the Order of the British Empire

[illegible] F. W. Bingham, M.B., B.Ch.

[illegible] F.R.C.S., M.S., M.B., Ch.B.

[illegible] of the British Empire

[illegible] Mottram, Chief O.A., R.N.N.S.

[illegible] of the British Empire

[illegible] Adviser on Applied Hygiene to the Medical [illegible]

[illegible] Royal Navy [Surgeon [illegible] Path]

Associate of the Royal Red Cross

Miss B. F. [illegible], A.R.R.C., Q.A.R.N.N.S.

Mrs. J. T. S[illegible], Q.A.R.N.N.S.

Commander Brother of the Venerable Order of St. John of Jerusalem

Surgeon Rear Admiral [illegible] M.B., B.Ch., D.P.H.

Surgeon Rear Admiral [illegible] M. White, M.R.C.S., L.R.C.P.

Officer Brother of the Venerable Order of St. John of Jerusalem

[illegible] Captain [illegible] Stringwell, M.B., B.S.

Surgeon Captain K. C. [illegible], O.B.E., M.C., M.R.C.S., L.R.C.P.

British Empire Medal

Sick Berth Chief Petty Officer [illegible] Gallagher, P/MX 49948 [illegible] Lieutenant Commander D. Morgan [illegible] O.B.E.

[illegible]

[illegible] Captain J. [illegible] M.B. [illegible]

TRANSFERS TO THE PERMANENT LIST

[illegible] Lieutenant Commander R. T. Lawler, R.N. (Emergency) [illegible] List 14th April 1947.

[illegible] Lieutenant Commander C. M. [illegible] transferred to the Permanent List 10th April 1947.

[illegible] Lieutenant (D) R. T. [illegible] transferred to the Permanent List [illegible]

TRANSFERS TO SHORT SERVICE COMMISSIONS

Surgeon Lieutenant J. C. S. Pearson transferred to a Short Service Commission 15th May 1947.

Surgeon Lieutenant H. Whittaker transferred to a Short Service Commission 26th May 1947.

PROMOTIONS

Surgeon Lieutenant (D) J. Hunter promoted to Acting Interim Surgeon Lieutenant Commander (D) 2nd July 1946.

Surgeon Lieutenant A. C. Hamer promoted to Acting Interim Surgeon Lieutenant Commander 3rd September 1946.

Surgeon Lieutenant J. F. Morgan promoted to Acting Interim Surgeon Lieutenant Commander 7th November 1946.

Surgeon Lieutenant Commander J. I. S. Steel [illegible] promoted to Acting [illegible] Surgeon Commander 23rd January 1947.

Surgeon Lieutenant J. H. D. Taylor promoted to Acting Interim Surgeon Lieutenant Commander 10th March 1947.

Acting Surgeon Commander E. [illegible] promoted to Acting [illegible] Surgeon Commander 21st March 1947.

Surgeon Lieutenant Commander [illegible] H. Lamb promoted to Acting [illegible] Surgeon Commander 23rd March 1947.

Surgeon Lieutenant Commander B. R. Manson promoted to Acting [illegible] Surgeon Commander 2nd April 1947.

Surgeon Lieutenant A. J. C. [illegible] promoted to Acting Interim Surgeon Lieutenant Commander 17th April 1947.

Surgeon Lieutenant Commander J. [illegible] promoted to Acting [illegible] Surgeon Commander 23rd May 1947.

Surgeon Lieutenant Commander J. [illegible] promoted to Acting [illegible] Surgeon Commander 23rd May 1947.

RETIREMENTS

Surgeon Lieutenant Commander W. J. Latham, *O.B.E.*, [illegible] (own request) 26th March 1947.

Surgeon Captain J. T. Kelly, *D.S.C.*, retired 22nd April 1947.

Surgeon Captain [illegible] M. Gimlett released 28th May 1947.

Surgeon Captain C. W. Wardle [illegible] to the Retired List 31st May 1947.

Surgeon Commander H. S. Mark placed on the Retired List [illegible] 28th June 1947.

Surgeon Captain J. G. Boal released [illegible]

ENTERED FOR SHORT SERVICE COMMISSIONS

[illegible] A. Daly, M.B., B.Ch., entered as Acting Surgeon Lieutenant for Short Service Commission 19th April 1946.

J. B. Hickey, M.B., B.Ch., entered as Acting Surgeon Lieutenant for Short Service Commission 2nd May 1947.

[illegible] entered as Acting Surgeon Lieutenant [illegible] 23rd May 1947

[illegible] M.R.C.S., L.R.C.P. entered as Acting Surgeon Lieutenant [illegible] on 23rd May 1947

[illegible] M.B., Ch.B. entered as Acting Surgeon Lieutenant [illegible] June 1947

[illegible] L.D.S. entered as Acting Surgeon Lieutenant [illegible] June 1947

[illegible] L.D.S. entered as Acting Surgeon Lieutenant [illegible] June 1947

[illegible] L.D.S. entered as Acting Surgeon Lieutenant [illegible] June 1947

ROYAL NAVAL VOLUNTEER RESERVE

EXTENDED SERVICE COMMISSIONS

[illegible] Commander J. M. Gillespie granted five years Extended Service [illegible] 1st Jan. 1946

[illegible] Commander J. [illegible] granted five years Extended Service [illegible] 1946

[illegible] Lieutenant [illegible] W. R. Alderson granted five years Extended Service [illegible] from 26th March 1947

[illegible] Lieutenant J. M. Hanson granted five years Extended Service [illegible] 1947

[illegible] Lieutenant Commander W. A. Bennett granted four years Extended Service Commission from 21st April 1947

Surgeon Lieutenant [illegible] Le Clercq granted four years Extended Service Commission from [illegible] April 1947

Surgeon Lieutenant [illegible] M. Nichol granted four years Extended [illegible] from 1st May 1947

Surgeon Lieutenant P. A. H. Clements granted [illegible] Extended Service Commission from [illegible] May 1947

Surgeon Lieutenant R. Deans granted five years Extended Service [illegible] from 12th May 1947

Surgeon Lieutenant W. B. Jack granted five years Extended Service Commission from 12th May 1947

Surgeon Lieutenant B. Marsden granted four years Extended Service [illegible] from 19th May 1947

Surgeon Lieutenant T. C. Barnes granted five years Extended Service [illegible] from 19th May 1947

Surgeon Lieutenant (D) R. Montgomery granted four years Extended Service Commission from 2nd June 1947

RETIREMENTS

(Class A Releases—Surgeon Commanders [illegible])

Surgeon Captain H. Parry Price released 23rd May 1947

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

RETIREMENTS

[illegible] Chief Miss M. Goodrich *R.R.C.* placed on the Retired List 14th [illegible]

WARDMASTER OFFICERS

RETIREMENTS

Temporary Acting Commissioned Wardmaster C. [illegible] Chenery released [illegible] September 1946

Temporary Acting Commissioned Wardmaster P. [illegible] Kemp released [illegible] period

Notices

KING EDWARD VII CONVALESCENT HOME FOR OFFICERS AT OSBORNE

OSBORNE HOUSE, East Cowes, Isle of Wight, formerly the home of Queen Victoria, was given by King Edward VII to the nation on his coronation, and has since served as a convalescent home for officers, serving and retired, of the three fighting Services and male established officers of the Indian, Colonial and Home Civil Services under the management of the Commissioners (now Ministry of Works). In this the Ministry is advised by a house committee consisting of senior members of the Civil Service, the Permanent Secretaries of State for War and Air, the Naval Secretary to the First Lord and the Medical Directors of the Admiralty, War Office and Air Ministry. There is also a consulting staff including leading specialists actively associated with the larger London hospitals.

There are a resident medical superintendent and a fully qualified nursing staff. A qualified physiotherapist supervises the physiotherapy department and there is also a scientifically trained and qualified remedial gymnast who is in charge of those rooms which are equipped with all the latest apparatus for general and special remedial exercises. Remedial games also are carried out under medical supervision. Medical attendance including the advice of the visiting consultants is free, but a small charge (usually 6d. per day) is made for special treatment such as massage, diathermy, ionization, radiant heat, paraffin wax, ultra violet rays and other electro-therapeutical treatment. In the case of serving officers and ex-officers sent by the Ministry of Pensions this charge is remitted. In fact, Osborne House possesses all the facilities and amenities for the complete rehabilitation of officers recovering from recent medical illnesses, accidents and surgical operations. Tuberculous, psychiatric and incurable patients are not eligible for admission.

There is accommodation for 60 patients, and by previous arrangement certain bed [illegible] can be accepted. Osborne House is situated on the Solent in an exceptionally beautiful park of 350 acres, which contains a nine-hole private golf links and bathing beach. Walks in the private woods adjoining the Estate along the coast also are available for the patients, and grass tennis courts, a croquet lawn and bowling green for use during the summer months. There is also a recreation hall provided with a piano and radio-gram where dances and theatricals take place and where cinema films are shown during winter months; an excellent library and billiards tables, &c., are provided. There is a hostel in the grounds where the wives and families (except very young children) of patients can be accommodated at the charge of [illegible] 6d. per week. They are permitted to take part in all the amenities of the Home, and a comfortable sitting room is provided in the House for them.

Patients are met on arrival at Cowes or Wootton Station by one of the Home's cars, which are also available for their use in touring and may be hired for a small charge for necessary visits within the Island. Garage accommodation is available for patients bringing their own cars. No dogs are allowed.

The charges are as follows:—

(a) In the case of serving officers (other than those paid at Government expense) and ex-officers sent by the Ministry of Pensions, [illegible] per day.
(b) Retired or ex-officers not sent by the Ministry, 6s. 0d. per day.
(c) Officers of the Civil Service, 10s. 6d. per day.
(d) Officers on half pay, 4s. 6d. per day.

Arrangements for admission may be made direct with the House Governor, to whom application should be made for further particulars and booklet.

Telegraphic address: "Convalescent, Cowes."
Telephone No.: Cowes 251.

R.A.M.C. THE CONSULTANTS' PRIZE

[illegible] between the War Office and the Armies in the field [illegible] memory by the Royal Army Medical College [illegible] to be competed for annually as a [illegible]. [illegible] will be awarded for the first time in 1948 and will be [illegible] open to serving officers of the Royal Army Medical Corps [illegible] permission.

[illegible] not more than 10,000 [illegible] 1947 [illegible] that which the prize [illegible] and possible for publication.

[illegible] through the usual channels [illegible] R.A.M. College, Millbank, London, S.W.1 [illegible] August 1948.

LEISHMAN, ALEXANDER AND PARKES MEMORIAL PRIZE FUND

We have been asked to announce that the following prizes are open for award in 1948.

(1) The Leishman Memorial Prize

A [illegible] medal and a sum of approximately £30 to the individual officer of the [illegible] Army Medical Corps (not yet retired from the Corps but still on the active list [illegible] Royal Army Dental Corps for the best work in [illegible] medicine, surgery, [illegible] commission with the general duties of the Royal Army Medical [illegible] Royal Army Dental Corps brought to the notice of the Prize Fund [illegible] completed within the year. The prize [illegible] holding regular or short service commissions.

(2) The Alexander Memorial Prize

A [illegible] medal and [illegible] approximately £70 [illegible] individual officer of the [illegible] Army Medical Corps holding a regular or short service commission or an officer [illegible] still on the active list [illegible] during the year [illegible] surgery [illegible] hygiene or military pathology. [illegible] original articles [illegible] military medicine, surgery, hygiene or pathology and [illegible] medical journals. [illegible] an officer [illegible] hold this prize.

(3) Parkes Memorial Prize

A [illegible] medal and [illegible] approximately £40 [illegible] regular serving medical [illegible] the Royal Navy, the Army or the Indian Army as in the opinion [illegible] of outstanding merit has been [illegible] hygiene. [illegible] consideration will be given to [illegible] investigations [illegible] medical journals [illegible] officer to the [illegible] prize.

(4) [illegible] Alexander Memorial Prize and the Parkes Memorial Prize are not open [illegible] the Royal Naval Medical School, the Royal Army Medical [illegible] Degree.

[illegible] through the usual channels with copies of original [illegible] the Hon. Secretary, R.A.M.C. Prize Funds, [illegible] R.A.M. College, Millbank, London, S.W.1, by 31st December 1948.

THE SERVICES' HYGIENE OFFICERS' GROUP OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH

The Society of Medical Officers of Health traces its foundation to 1856 [illegible] the then recently appointed medical officers of health [illegible] London vestries. Colleagues from the provinces [illegible] formed local associations [illegible] merged with the [illegible] that the Society covered the whole country by 1888.

With the great development of preventive medical services since 1908 the [illegible] of the Society has become somewhat [illegible] approximately two-thirds of its [illegible] 2,000 now consist of whole-time public health medical officers [illegible] maternity and child welfare, school health services, industrial medicine, [illegible] fever hospitals and [illegible] It has [illegible] hygiene.

Many members of the Society joined the Army [illegible] during the war of 1914-1918 [illegible] In 1921 the Navy, Army and Air Force Hygiene Officers' Group of the Society [illegible] 1940 [illegible] president [illegible] Sir [illegible] Sir William [illegible] Sir R. B. [illegible] David [illegible] Arthur [illegible]

In World War II [illegible] tackling [illegible] Brigadier [illegible] C.B.E., D.S.O., R.A.M.C. [illegible] In 1946-1951 [illegible] Clark [illegible] R.A.M.C. [illegible] N.W. [illegible]

[illegible]

[illegible]

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Preparations

[illegible]

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Notice

[illegible] and manuscripts [illegible] [illegible] [illegible]

[illegible] published in the Journal [illegible] Naval [illegible] of the Journal [illegible] [illegible]

The Harvard system should be employed for bibliographical references. These [illegible] the authors' names at the end of the [illegible] *[illegible] Nav. Med. Serv.* **22** 53. In the text [illegible], the author and in brackets the date [illegible]

All communications should reach the Editors on or before the first of the month preceding the date of issue. Unless clearly written they should be typed in order to avoid mistakes, and they should be addressed to the Editors, JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE, Royal Naval Hospital, Haslar, Gosport, Hants.

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The payment of subscriptions by banker's order is recommended as it relieves the subscriber of the necessity of forwarding a cheque each year and simplifies the keeping of accounts.

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VOLUME XXXIII OCTOBER, 1947 No. 1

Journal
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Articles.

AN ACCOUNT OF A SMALLPOX EPIDEMIC

BY

Surgeon Lieutenant-Commander L. G. P. SHIERS, F.R.C.S.Ed., R.N.V.R.

APART from sporadic outbreaks occurring in relation to the major seaports smallpox is a rare occurrence in this country. While serving in H.M.S. *Dauntless* in April 1943, I had the opportunity of dealing with a large outbreak of smallpox which occurred at Bakhah, an Arab village on the shores of the Persian Gulf. The following is an account of our experiences during the three weeks we remained ashore and of the measures which we took to control the epidemic.

The medical party landed on the morning of 5th April, all of us having been revaccinated immediately we had received the signal requesting assistance

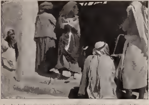

FIG. 1.—An Arab woman just after vaccination. [illegible] the small amount of skin exposed on her arm—modesty prevented [illegible] rolling up the sleeve.

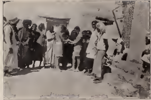

Fig. 2.—Some of the Sheikh's warriors "gooking" while two of the medical party are vaccinating.

from forty-eight hours previously. After a preliminary palaver with the Sheikh and his counsellors, carried out of course via our interpreter, we took quarters in a large mud house close to the sea and commenced a mass vaccination of the remaining healthy inhabitants of the stricken village.

It was here that our first difficulties arose. The men were eager to have their arms marked, but the Arab woman is, at any rate ostensibly, remarkably modest, and a description of her dress now becomes necessary. The standard outdoor rig was a pair of black cloth trousers gathered tightly at the waist and ankles. Over this was worn a tunic of the same material reaching below the knees and having long sleeves fastening tightly at the wrists. Excepting only the eyes, the face was covered by a stiff black mask, and the shoulders and head were draped with a heavy black veil. Apart from the bare hands and feet, therefore, not a single square inch of skin was available for vaccination.

Our requirements were explained to the Sheikh, who held a prolonged and animated conference with his Grand Vizier. As a result of this it was decided that, while it was unthinkable that an Arab woman should display her bare arm to the eyes of the Infidels, in view of the extreme urgency of the situation a small tear could be made in the sleeve over the upper arm and the necessary scratch made in the tiny area of dirty skin thus presented. The giggling, squealing women, assisted to a remarkable degree by well placed lashes from the camel canes of the Sheikh's warriors, were then herded into line and we proceeded with our vaccination.

It was interesting to note that the deeper the scratch the more the men were pleased and indeed a few days later when the vaccinations were beginning to show we were pleased with unsatisfied patients who [illegible] complain that their neighbour's arm [illegible] had a much bigger scab than their own! This attitude rather suited us as on their tough leathery skin one gentle needle stroke through a drop of lymph often required repetition and lymph was scarce. Accordingly we modified our technique and while one person swabbed the piece of skin with soaped cotton wool another dried it and blew on a drop of lymph while the third nicked through the lymph with a scalpel. This method rarely failed and gave a papule about the size of a sixpence.

Some days after this I found one of the sailors had modified our vaccination technique still further by making his nicks in the form of small Victory Vs.

By sunset on the first day we had vaccinated 803 men, women and children. When one realizes that a lot of these were unwilling, constantly running away and being recaptured by their angry relatives, that the temperature was as hot as only the Persian Gulf can be, and that throughout the day we were plagued by swarms of vicious flies which could (and did) draw blood even when biting through two layers of stocking, it may be considered a fair day's work.

That evening the Senior Medical Officer (Surgeon Lieutenant Commander J. N. Cave, R.N.V.R.) returned to H.M.S. *Dauntless* which continued her patrol; the medical party consisting of myself, one Sick Berth Attendant, three Ordinary Seamen, a Signalman, an Arab interpreter and a bodyguard provided by the Wali of Khassab and told to remain at my side night and day, commenced a fascinating three week stay as the guests of Sheikh Mohamed bin Ahmed, descendant of the Prophet.

The following morning we recommenced vaccinating at dawn and completed a further 200 cases before noon. We then set out to reconnoitre the village. Apart from the Sheikh's house—a solid square stone fort reminding one vividly of the film *Beau Geste*—the inhabitants of the village, numbering over 2,000, lived in cramped dirty hovels built directly on the sandy, stony desert. The people already infected with smallpox were herded together in a tragic community on the western outskirts of the village (the prevailing wind was easterly). There they had been driven by stones, their feet wrapped in strips of torn clothing so as not to defile the earth, and there they were left to live or die as Allah willed.

I personally had never before seen a fully developed case of smallpox and subsequent conversations with numerous other doctors find me not alone in this respect. Here then is a picture of the fully developed case. Imagine the worst vaccination "take" you have ever seen—a deep, punched out, sloughing pit. Multiply this a thousandfold until the lesions are scattered all over the body, the forehead, face, chest, back and the arms; picture them on the scrotum, the penis and sometimes, when the oedematous eyelids are forcibly separated, on the eyeball itself. Now cover this agonized mass of sores with millions of flies crawling obscenely even into the mouths of the more weakened victims. Add to this the crying of the affected babies and the wailing of the women whose men were dying. Picture the vultures circling lazily and confidently overhead and remember always that the whole scene is set in the pitiless [illegible] it makes even the stones on the ground too hot to touch.

Here [illegible] remarkable fact. If a man were smitten with the disease and stoned from the village his entire family moved with him—his sons and daughters, wives and slaves. They moved with him to this dung heap and there inevitably they contracted his disease. If a woman were infected she suffered alone. [illegible] fond husband accompanied her, no slave went with her, and she lay alone on the ground. When thirsty she crawled to the well and, when too weak to crawl, she died.

By the evening, with every able bodied man and boy in the village assisting, we had built a hospital thatched with palm leaves and recruited a staff of nurses from men and women who had had smallpox as children and were, therefore, presumed immune. Food and water was carried twice daily from the village by runners and *tipped* into vessels brought by the nurses to a gap in the boundary fence around the hospital. One of the hands (I took a different

[illegible] given him. These are worn [illegible] hunt or trader is so entitled.

one each time) and I did an evening round every day wearing gowns soaked in buckets of Dettol solution masks and rubber gloves As soon as the round was finished we would strip return the garments to the Dettol bucket and enter the sea Here we washed each other down and then gargled with sea water running it down through our noses

The following is a summary of our figures and observations —

(a) A total of 3 091 people were vaccinated and during our three week stay there were 10 deaths and 22 fresh cases none of which occurred during the last seven days the epidemic then being under control

(b) No matter how dense the lesions *the axilla was always spared* this confirms the observation of Ricketts (Ricketts sign of the axilla)

(c) In a fresh case the eruption almost invariably appeared first on the forehead at the line of the hair margin Two cases were exceptions to this rule within forty eight hours of vaccination papules had appeared on the *extensor* aspects of the forearms and it was obvious that these patients were incubating the disease which was modified by their vaccination

(d) The temperature *always* ranged around 103 to 105° F

(e) The commonest complication was sepsis due to the flies There were six cases of bronchopneumonia one of pleurisy and one of rapidly sloughing keratitis Severe conjunctivitis was common

(f) The youngest patient was 3 weeks old the eldest between 60 and 70 years of age both recovered

Of the strange scenes we witnessed of the female slaves presented to me by the grateful Sheikh of the fantastic Arabian Nights " feast at which I was the guest of honour there is not space enough in this journal to tell

I cannot finish however without paying tribute to S B A A F Warner Ord Seaman G C Lon Ord Seaman G A Parker Ord Seaman L J Whale and Signalman C E Pickett who once again demonstrated so superbly the versatility of the British sailor and without whose loyal and cheerful co operation nothing could have been achieved

A SIMPLE METHOD OF BRONCHOGRAPHY

BY

Surgeon Lieutenant-Commander G L HARDMAN, R N.

Four methods of bronchography are commonly described These are — (1) The transglottic after spraying the larynx with cocaine and dropping cocaine through the vocal cords into the trachea the opaque oil is injected over the back of the tongue with a curved catheter about 1 ml at the end of each inspiration (2) The nasal catheter method a gum elastic catheter is passed through the nose into the larynx and then through the cords into the trachea (3) The oil is introduced through a catheter which has been positioned at bronchoscopy (4) Direct injection into the trachea through the crico thyroid membrane

The transglottic method is not the writer considers an easy one His

w

attempts at this have been failures but possibly through faulty technique. The nasal catheter and bronchoscopy methods are those for the expert in laryngology. Direct injection through the crico-thyroid membrane is popular as it does not require any specialist skill but its great disadvantage is that it takes time and is difficult without a special syringe for injecting the oil. It must be extremely unpleasant for the patient and, considering the frequency with which oil is seen on skiagrams in the soft tissues, it is not a certain method and there must be some risk, small no doubt, of an infected mediastinum. It is also an alarming procedure for the operator.

There is another method—aspiration bronchography—which because of its quickness, simplicity and efficiency deserves to be better known that it is. I first saw this during the war at the King George V Hospital, Durban, where it had been in use for several years, having been imported originally from the United States of America. The method has recently been described by Ritchie (1946) and given by him the name of aspiration bronchography.

The procedure I have been using is a slight modification of that of either the King George V Hospital or Mr. Ritchie. The patient is tested for cocaine sensitivity by the subcutaneous injection of 1/12 grain cocaine hydrochloride and observing the effect, if any, on the pulse rate. Some workers, including those at Durban, also test for iodide sensitivity by giving a dose of 30 grain of potassium iodide by mouth. This is probably a wise precaution. No other preparation is required but bronchography should not be carried out directly after a meal as there may be some nausea. Using a spray with a beaked nozzle the larynx and one side of the nose are sprayed with cocaine. The strength does not matter—4 or 10 per cent can be used with equal success. A good light should be available and a spatula used to get the cocaine down into the larynx. The patient will require a bowl to spit into during the spraying. There is no spraying dose; only judgment and experience will indicate when the larynx is anaesthetized.

The oil is poured into a 20 ml. syringe, to the nozzle of which is attached about 3 inches of rubber tubing. Warming the oil, although generally advised, is best avoided as many of the preparations at present on the market are so viscid that warming will increase the tendency to alveolar filling. While the oil is being introduced the patient should lean backwards and towards the side to be filled. The distal part of the tongue is wrapped in a gauze swab and held well forward by the patient between the forefingers and thumbs of both hands. With the patient breathing steadily through the open mouth the catheter is introduced along the floor of the cocainized side of the nose and oil injected; it takes an appreciable time to run down, as can be verified on screening. During this time the patient must concentrate on breathing through the mouth and must resist the urge to swallow, however great the temptation. With the patient leaning backward and to one side the oil will run into the lower lobe. With him leaning forward and to the side the oil will run into the middle lobes. To fill the upper lobes, as soon as it is considered the oil has reached the trachea the patient must be placed horizontal, first in the posterior oblique position and then in the anterior oblique position. One lower lobe can be filled [illegible] wet and [illegible] the whole of [illegible].

If it is proposed to fill only the lower lobe or the [illegible] lobe it is convenient to make the injection with the patient [illegible]. To fill the whole of one side it is convenient to make the injection with the patient sitting on the edge of the X-ray couch or, if this is a tilting one, with it at about 45 degrees and lower it to horizontal on completion of the injection (fig. 1). Having filled the upper lobe the skiagram must be taken with the patient in the horizontal position.

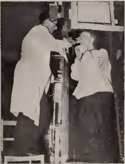

Fig. 1

No originality is claimed for this method, nor that it will produce results every time; it is simple however, very quick and causes little discomfort to the patient. One of the more elaborate methods can be tried later if it fails. The mechanism depends on filling the pyriform fossæ with oil from where [illegible] flows into the trachea. As with many other comparatively simple procedures success depends on the operator's self-confidence and ability [illegible] the patient. Premedication with either morphine or omnopon is not recommended as it increases the liability to cocaine reactions. Fig. 2 shows all the

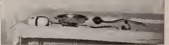

FIG. 2

gear required: this consists of swabs, a dish for the patient to spit into, a 20 ml. syringe, spatula, and spray with 4 to 10 per cent. cocaine hydrochloride. The whole procedure can be completed in ten minutes.

BIBLIOGRAPHY

RITCHIE, D. C. (1946) *Brit. J. Radiol.* **19**, 471.

RÉSUMÉ OF CAUSES FOR NON-ACCEPTANCE OF, AND FOR OPERATIVE TREATMENT CONSIDERED NECESSARY ON NEW ENTRIES (N.S.) ALREADY PASSED AS FIT BY CIVILIAN MEDICAL BOARDS

BY

Surgeon Commander C. V. HARRIES, R.N.

DURING the year ending 30th June, 1947, new entries (comprising Special Service, Continuous Service candidates and National Service ratings) joining H.M.S. *Royal Arthur* totalled 13,465. With few exceptions, these were youths between the ages of 17 and 19 who had already been physically examined by the civilian medical boards and passed as fit for service.

Nevertheless, they underwent a medical examination again within forty-eight hours of arrival at Corsham. This examination included a fluorograph of the chest, visual acuity and colour vision tests, and a physical inspection during which reference was made to their past health and often that of their family. If anything of a dubious character or a physical defect was detected the rating was referred to the appropriate specialist specialists in medicine surgery radiology and ophthalmology are borne in the Establishment

In the case of abnormal fluorographic finding it was followed by a more thorough questioning of the entry's past and present health with that of his family with a full clinical examination erythrocyte sedimentation rate estimation sputum test and usually a large X ray of chest If suspicions were substantiated the case was admitted into a special ward for further investigation before a decision as to final disposal was made

Those found medically unfit within a week of entry were dealt with in accordance with A F O 1801/43 as follows —

Para 1 (a) *Cases of tuberculosis* Discharged on the authority of the Commanding Officer Admiralty was informed and letters were also sent to the Medical Officer of Health in the patient's district the family doctor and the next of kin

Para 1 (b) 2 *Non tuberculous cases* Signal sent to Admiralty for decision as to disposal

In the case of ocular defects Admiralty letter No 11543/44 was referred to for guidance

Youths developing disabilities during their period of training or whose defects were discovered after one week or more of service were brought forward for survey and dealt with under A F O 2104/40 and those invalided were discharged in the usual manner

Of the 13 465 entries 93 tuberculous cases were discharged to shore under A F O 1801/43 para 1 (a) 72 non tubercular cases under A F O 1801/43 para 1 (b) 2 18 ocular defects according to Admiralty letter No 11543/44 and one fraudulent entry making a total of 184 Those surveyed to shore under A F O 2104/40 totalled 31

The individual diseases included 4 epileptics 21 nocturnal enuresis 9 with diseases of the ear 6 asthmatics 6 sequelae pneumonia 11 sequelae pleurisy of undefined aetiology and 10 with other diseases of the chest There were 6 cases of skin diseases not amenable to treatment Operative treatment was performed on 94 entries following which they were graded as category one Operations included 60 radical cures of hydrocele 17 undescended testicles —in some cases neither testicle was in the scrotum—4 for plastic repair of hypospadias and 13 herniotomies

SUMMARY

During the year ending 30th June 1947 13 465 new entries previously examined by civilian medical boards joined H M S *Royal Arthur* of whom 215 were considered medically unfit and discharged to shore 94 underwent operative treatment before being graded as category one

I am indebted to Surgeon Captain F L H MacDowel R N for permission to publish this article [illegible] Naval [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Total
[illegible]		1				1
Epilepsy					[illegible]	[illegible]
Other [illegible] cases [illegible] mental					[illegible]	[illegible]
[illegible]		1			[illegible]	[illegible]
[illegible]		1				1
[illegible]			18		1	[illegible]
[illegible]		[illegible]			[illegible]	[illegible]
[illegible]		[illegible]			[illegible]	[illegible]
[illegible]		[illegible]				[illegible]
[illegible]		8			[illegible]	11
Other [illegible]						[illegible]
Other diseases of the stomach		1			[illegible]	[illegible]
Muscles [illegible] tendons [illegible]		[illegible]				2
Deformities, congenital [illegible] formation		3			2	[illegible]
Other genito-urinary diseases					1	1
Eczema		2				[illegible]
Other skin diseases		3				[illegible]
Sequelae to [illegible] dents [illegible]		1				1
Sequelae [illegible] injury P.T.I.		1			[illegible]	[illegible]
Tuberculosis	[illegible]				[illegible]	[illegible]
Total	[illegible]	72	18	[illegible]	[illegible]	215

SOME RECENT ASPECTS OF MEDICAL TREATMENT

BY

Surgeon Commander H. J. BENNETT, R.N.

Recent years have shown giant strides in advances in medical treatment and many great achievements of the sulphonamide group of drugs and penicillin are too well known to require much comment. Many conditions formerly requiring long periods of hospitalization or with a grave prognosis have now been reduced considerably in their length of stay in hospital or the prognosis very greatly improved. To instance two examples: the twenty-one days in hospital averaged previously for Vincent's angina is now reduced to approximately seven days, meningococcal meningitis changed from an almost invariably fatal disease to one easily controlled with chemotherapy.

A recent point in penicillin therapy is that up to a total of 20 000 units in two separate injections of 8–10 000 units may be injected intrathecally without producing a reactive adhesive arachnoiditis; this is approximately twice the quantity first considered as a maximal amount permissible in this site. Naturally it is reinforced with systemic penicillin and sulphonamides, the systemic treatment really taking precedence over the intrathecal route.

The most recent of the sulphonamides—thalyl sulphathiazole—is said to be as effective as sulphaguanidine or succinyl sulphathiazole in the treatment of dysenteric disorders in smaller dosage, giving the advantage of a considerable reduction in the actual number of tablets taken by the patient. The swallowing of anything up to 100 ½ gramme tablets over a period of a few days could be distressing to an ill subject.

The use of streptomycin in pulmonary tuberculosis has not proved to be of dramatic value so far, and the normal methods of treatment by bed rest, adequate nutrition, or active measures such as artificial pneumothorax, pneumoperitoneum, phrenic crush or avulsion, or thoracoplasty, remain the preferential therapy. However, it has its place in the reinforcement of bed rest and in certain cases of advancing bilateral disease unsuitable for other modes of treatment. Its use in tuberculous meningitis has been disappointing, although it has received considerable publicity in the lay press for this condition, which still retains its extremely grave prognosis.

In the pulmonary cases where it has been used with some apparent success, large dosage over very long periods, i.e. several months, is necessary, and it is difficult to assess how much improvement has been due actually to the drug in this unpredictable disease, where normal arrest of activity may have taken place anyway. It has been of great use in some pyogenic infections which have proved resistant to sulphonamide or penicillin therapy, and as such is a further notable advance.

The production of paludrine as an anti-malarial remedy is likely to replace atebrin or mepacrine treatment or prophylaxis. Sufficient large-scale work has not been published yet, as it appeared too late during the recent war to try it out with large bodies of men in malarial areas. It controls clinical malaria quickly and in small doses acts as an adequate prophylactic, especially with malignant tertian malaria, and slightly less so with benign tertian malaria, and will undoubtedly prove itself to be a most valuable drug.

The development of thiouracil in the treatment of thyrotoxicosis is one of specific value, although it cannot replace surgical treatment. The recent propyl thiouracil has less toxic effect and is less likely to produce an agranulocytic reaction than is its forerunner methyl thiouracil. Its great use is in the pre-operative stage in severe cases for metabolic stabilization, but has the unfortunate surgical effect of producing an extreme degree of vascularity of the thyroid gland. Lugol's iodine is given in addition, therefore, for a short period before operation is undertaken, to reduce this and to facilitate the surgical technique. Control examination of blood for any agranulocytic change should be done always during thiouracil therapy, in order that administration may cease and appropriate action be taken in good time should this happen.

The use of heparin and dicoumarol has greatly facilitated control of a spreading venous thrombosis and has been applied in threatened or actual cardiac infarction from coronary disease. Technique of use consists of a heparin intravenous drip 75 mg. to one pint of saline using a total of approximately 250 mg. heparin in twenty-four hours for the first forty-eight hours with simultaneous administration of approximately 300 mg. dicoumarol in the first twenty-four hours reducing to 200 to 100 mg. on succeeding days and continuing with the 100 mg. *per diem* dosage as long as necessary; the actual dosage is controlled by an estimation of the required prolongation in blood clotting time. The two drugs are given simultaneously at the commencement of therapy, the heparin taking immediate effect while the delayed absorption and action of dicoumarol comes into force, after which it is discontinued.

This technique can be used in spreading peripheral thromboses, and in anginal attacks with threatened cardiac infarction it becomes a method of combating a medical emergency which may save the patient's life. When one considers the enormous increase in cases of angina or actual coronary thrombosis in recent decades—probably resulting from the pace of modern life—dicoumarol may well prove to be an extremely valuable adjunct in medical therapy.

There appears to be an increase in the use of potassium thiocyanate in moderately severe hypertensive states, either to control distressing symptoms such as headache or vertigo, or to reduce the actual level of blood pressure should it reach alarming heights. However, care must be exercised that the reduced level is sufficient for the cerebral circulation which has become to some extent adjusted to the higher level over a lengthy period. Potassium thiocyanate is given over long periods in dosages of approximately 1½ grains t.i.d., the actual amount being controlled by frequent estimations of the blood thiocyanate level. Further work is being done in certain cases where hypertensive states are coincident with unilateral renal disease, and the possibility of treatment of the hypertension by nephrectomy.

To the wide variety of drugs used to control epilepsy Epanutin has been added. This appears to be effective in many cases which have not responded to other methods of treatment, and has the advantage of not producing the depressing effects of the barbiturates. It is used in about the same dosage as Luminal, but over long periods is liable to produce toxic affects and a hyperplasia of the gums.

A word may be said here in recapitulation regarding the treatment of status epilepticus, a medical emergency requiring immediate treatment that any medical officer may be called upon suddenly to control. Every effort should be made to subdue the patient from his continued convulsive attacks, and the following method may be used. Intravenous injection of pentothal or evipan up to 1 gramme can be given, preferably the latter, as it is *not* an easy matter to give an accurately intravenous injection to a convulsive subject, and evipan has the advantage of not causing sloughing of the surrounding tissues if perchance some of it is given outside the vein. 10 c.c. paraldehyde may be injected intramuscularly. It is a reasonably stable preparation [illegible] and no further measures to effect its sterility are necessary providing the stock solution is not old. Fairly rapid absorption takes place, and with either of the above measures the patient is under quiet control for long enough to institute less dramatic therapy. As he is unlikely to be able to swallow at this stage 3 grains Luminal (soluble) may be injected hypodermically or a paraldehyde rectal drip set up. Immediately these measures are in progress an intravenous glucose saline drip is commenced, and after twenty-four hours the patient may be permitted to come out of his deep narcosis to a state where he can swallow, when further Luminal or paraldehyde may be given by mouth.

It is necessary to keep careful watch of the pulse and respiration rate, attention is needed to the bowels by means of simple enemata, and his nutritional state kept up. In a few days he should be well under control and the stabilizing dosage of bromides or Luminal decided upon. In due course, if it is found that Epanutin is more satisfactory, the change over from Luminal to this drug should be done by stages, gauging the therapeutic effect upon the patient from day to day.

The treatment of diabetes mellitus in recent years has been made less onerous to the patient by the introduction of zinc protamine insulin and Globin insulin, both of them slow absorbing and long acting insulin preparations, and it may be possible to control the patient requiring insulin by a single or twice daily injection instead of the more frequent injections used formerly.

No further addition to a real attack on the problem of peptic ulcer has appeared yet, and theories as to its endocrine origin have not been of practical value in treatment. It has been shown that tobacco has no deleterious effect on the peptic ulcer subject. The increased incidence is quite possibly related—like angina—to the stress of modern life. In acute ulcer with severe pain rapid improvement and subsidence of pain takes place when the patient is put to bed and a continuous intragastric citrated milk drip started. This method of therapy is at present made difficult, unfortunately, by strict milk rationing obtaining throughout the country.

The fashionable use of vitamins and endocrine compounds has produced a spate from the manufacturers under a bewildering variety of trade names, and it is difficult sometimes to sort them out. Mention may be made of the use of stilbœstrol in producing temporary symptomatic alleviation in malignant disease of the prostate.

Research into problems of metabolism has been facilitated greatly by the use of tracer elements from the atomic pile, and the use of radio phosphorus in therapy. Its main value at present is in polycythæmia vera, and may be preferable to the alternative of infecting the unfortunate patient with ankylostomiasis in order to produce a comparative anæmia. It has also been used (less effectively) in other conditions such as Hodgkin's disease, the leukæmias, and some malignancies—particularly the bronchopulmonary malignancy intractable to other methods such as deep radiation therapy. So called nitrogen mustard has also been used in these states with some success, but must be regarded as being still in an experimental state.

Work with folic acid has shown its value in the sprue syndrome but much less so in pernicious anaemia as the endogenous factor is still absent and therefore normal cells are not produced. Anahaemin or a similar preparation is still required. Any accompanying subacute combined degeneration of the cord may be arrested but little actual improvement of the central nervous system symptoms or signs can be expected.

The use of packed cells for transfusion in aplastic anaemia has reduced the number of transfusions required and in some cases considerably improves the normally grave prognosis. Plasma concentrate solutions have been used in nephrosis without any appreciable improvement over other methods of protein feeding.

But medicine is still faced with many common unsolved problems such as disseminated sclerosis or rheumatoid states which are productive of so much crippling and invaliding disease where the doctor is able to do little but ease his patient whilst watching helplessly the inexorable progress of the malady to its inevitable conclusion.

RECENT ADVANCES IN NAVAL HYGIENE AND PREVENTIVE MEDICINE

BY

Surgeon Commander G. H. G. SOUTHWELL-SANDER, R.N.

ADVANCES in naval hygiene and preventive medicine in recent years have been outstanding and have been due largely to the stimulus of war. Relying hitherto on the protection afforded by life afloat naval hygiene received a very rude shock with the onset of amphibious warfare and the establishment of naval bases and air fields in malarious and other pest ridden countries. Unlike their contemporaries in the Army the naval executive and medical officers had little or no experience of preventive medicine and the lessons were learned only after long and often bitter experience.

It is the tragedy of preventive medicine that none appreciates its value until a disaster occurs as the result of its neglect. The casualties caused by preventable diseases in the armed forces in the 1939-1945 war far exceeded the casualties due to weapons and in the far eastern theatres the ratio was often staggering. A few figures may be illuminating.

In the early operations in 1942 on Guadalcanal poor malaria discipline resulted in about 24 per cent. of the Allied forces being constantly on the sick list; when hygiene discipline had been greatly improved by the end of 1943 the figure fell to only about 1 per cent. The ratio of preventable diseases to wounds in the South West Pacific at one time rose as high as 130 : 1. In Burma in 1943 Allied admissions to hospital were 120 per cent. per annum. Improvement in hygiene, the use of mepacrine as a suppressive drug for malaria and the advent of D.D.T. reduced the ratio of sick to wounded from 120 : 1 in 1943 to less than 20 : 1 in 1944.

Unfortunately exact figures for the Navy are not available but reports indicate that [illegible] proper hygiene discipline and [illegible] exercised the sick rate fell dramatically at once.

I have endeavoured to indicate under the headings which follow the main directions in which advances have been made, and I have also suggested some of the main problems which still require solution and in which active research work is being carried out.

HABITABILITY

Perhaps the most fundamental advance in naval hygiene in recent years has been the study of "habitability" in ships. By this is meant living conditions, whether it be the effects of environment of high or low temperature and excessive humidity, overcrowding, diet, or the general welfare of personnel, which includes the provision of amenities necessary to make life tolerable under climatic extremes. The strictly medical aspect of the problem cannot be dissociated from the "social" aspect, and the two often have to be considered together.

In peacetime the effects of living in extremes of climate were not often seen, as the conditions were usually temporary. There was little overcrowding, conditions of work were more tolerable and amenities greater, but the ill effects of extremes of heat and cold on the health and efficiency of men in ships under war conditions were dramatically and painfully obvious.

The rapid development, the complexity of armament, radar and other "gadgets" necessary for the fighting of a modern warship, led to an enormous loss of living space and a large increase in the number of men required to operate them, in some instances up to a 60 per cent excess of normal complement. All these additional men and machines had to be fitted into an inelastic hull, often laid down a great many years previously for totally different requirements. Moreover, this machinery had to be operated under conditions of warfare—of long cruising periods at sea, prolonged hours at action stations under blackout conditions and the rigid requirements of damage control organization. The problem at issue was summed up in the words of the late Medical Director General of the Navy: "What is the ratio of the space allocated to the human element to the space allotted to the mechanical element of the total fighting machine (ship plus ship's company) which will make it the most efficient engine of war?" (Surgeon Vice Admiral Sir Sheldon Dudley in preface to B.R. 1472, *Environmental Warmth and its Measurement*.)

The effect of these operational requirements on the temperature, humidity and air movement in ships in extremes of heat or cold was phenomenal, and its results on the health and efficiency of crews became a most serious problem. To study these effects the Royal Naval Personnel Research Committee formed a Habitability Sub-Committee in 1943, whose purpose it was to see what immediate improvements could be made and to initiate a long-term research work into the immense problems involved. As a result some very far-reaching changes have been and are likely to be made in the ventilation systems and possibly in the design of ships.

Until that time the only standards for ventilation in ships had been those set up by the Ventilation Committee of 1937, which had recommended a figure of 2,000 cu. ft. per man per hour and never less than 1,500 cu. ft. per man per hour (i.e. a change of air every five minutes). No temperature standards were recommended except that a mess deck temperature of between 60–65° F. should be maintained in cold climates. It was obvious that, before any new standards could be laid down, the first requirement was to choose an index for the measurement of environmental conditions. Reliance had been placed hitherto on the dry and wet bulb thermometers and the low temperature kata thermometer, but these are insufficient for the assessment of all the factors involved such as radiant heat, air velocity, &c. The Habitability Sub-Committee adopted a single index by which the various factors of temperature, humidity and air movement could be expressed. This index is known as the effective temperature and can be described as a measurement of the warmth of the environment on the comfort sensation of the body. A variation of the index to include the important effects of radiant heat is known as the corrected effective temperature (C.E.T.). As a result of much research and experiment, and as a compromise between what is desired and what is practicable, the Committee has provisionally recommended a standard of C.E.T. of 80° F. as the upper desirable limit and a C.E.T. of 86° F. as the upper limit above which full efficiency will be impaired.

To collect the necessary information on environmental conditions a box of instruments is being issued to ships and elsewhere (A.F.O. 0602/46). When sufficient reports have been sent in, a mass of valuable data will be available for critical analysis. From this it is hoped naval constructors will be able to make fundamental improvements in the ventilation system of ships or, if need be, in the design of ships, in order to improve their habitability and achieve conditions in which the health and efficiency of crews will not suffer under extremes of climate.

Very little is known of the effects of climate on the human body. The problems to be solved are not purely naval and are equally applicable to communities living ashore. Here is an opportunity for the naval medical service to be pioneers in the field, and every medical officer of a ship can participate by taking accurate and painstaking measurements of conditions on board.

As the result of investigations already undertaken, the most important improvement to be carried out has been the adoption of *air conditioning*, which was realized to be the only possible method of meeting the standards of effective temperature recommended for the tropics. Air conditioning had been discussed by the Ventilation Committee of 1937 but because of the size, weight and cost of the plant was not regarded as essential.

The problems of weight and space are, in fact, the limiting factors at present in the adoption of wide scale air conditioning, and as a compromise it was possible to draw up only a priority list, and the most important compartments from the fighting point of view had to take precedence. The problem to be decided was: Is it better to cool working compartments or the mess deck so as to ensure a good spell of sleep? Air conditioning plants were universally installed in submarines in the tropics to enable them to operate for long periods at full efficiency. As a result the improvement in habitability was dramatic, and complaints of prickly heat, foot rot, diarrhoea, and the general mental and physical deterioration of crews disappeared almost overnight. It should be remembered that air conditioning can be applied equally to Arctic conditions, as the incoming air can be automatically dried or moistened and warmed or cooled as required.

Many problems in connexion with air conditioning have yet to be solved and standards of temperature and humidity will have to be laid down. For instance, what effect will drying of the atmosphere have on the respiratory tract? What are the results of air conditioning on the bacterial content of the air and consequent respiratory infections? What are the effects of re-circulating air on the incidence of air-borne diseases, and how is the process of acclimatization affected? All these and other problems are proper subjects for future research. As a temporary guide it may be said that air conditioning should maintain an effective temperature not below 78° F., or there should be not more than a 10° F. difference between the treated and untreated air.

Other improvements in habitability initiated or contemplated are:

(*a*) Supply of laundries in ships: besides being economical in man power, this will decrease the humidity caused by dhobeying between decks, and a constant supply of clean dry clothing is an important factor in maintaining health and morale.

(*b*) Provision of water cooling machines will have an effect in combating the evil effects of heat exhaustion.

(*c*) The habitability of living spaces will be improved by the adoption of centralized messing, and the use of different colour schemes for painting messes will give an effect of warmth and cheerfulness.

(*d*) The adoption of fluorescent lighting is an improvement which, as well as being more efficient, will reduce the radiant heat effects of filament lamps.

(*e*) Intensive research is going on into the problem of lagging to combat solar radiation and internal radiant heat, as well as to maintain heat in Arctic climates. The problem of humidity and "sweating" has to be considered at the same time.

(*f*) Research is being conducted into the most suitable form of clothing for use in the tropics or Arctic; requirements for tropical use have to be weighed against protection from burns, insects, gas, &c., and colour has to be considered in the light of reflective power, cleanliness and visibility. The particular requirements for aviation purposes have a widespread application.

(*g*) Thought is being given to the increase of cold storage space for fresh fruit and vegetables, an increased supply of refrigerators and the provision of cold water drinking fountains and ice cream machines.

(*h*) An increase in the exhaust as well as the supply ventilation is being considered.

Finally, the study of the relationship of the man to his job and his fitness to carry out his work efficiently under varying climatic conditions is of supreme importance. This is being adopted as the common sense approach to problems in industry and the application is analogous in the Navy. Such a study is being carried out and physiological and psychological tests have been carried out on naval volunteers in hot chambers in London and at Cambridge. Some very interesting results have been obtained on the critical stage at which fatigue and inefficiency supervene under operational conditions without the awareness of the individual. This work forms a notable advance in this relatively new branch of medicine.

Additional factors which must be considered in any review on habitability under climatic extremes are the lack of amenities, recreation, mail or domestic worries; though difficult to assess these are very important factors. Deterioration in efficiency and the development of a "tropical neurosis" is known to follow service in the tropics, but how much of this is due to effect of climate and how much to other factors already mentioned is yet to be determined. The recent discoveries of new insecticides and insect repellents, the development of air conditioning and the use of refrigerators will undoubtedly have a profound influence on habitability of the tropics, and will determine what should be the maximal period of service in tropical climates. Similar problems for Arctic climates require elucidation. The selection of the right type of man for service under tropical or Arctic conditions is a big question to which serious consideration is now being given. The adoption of the Pulheems system goes some way to select the man physically and temperamentally for his job, and may go far to exclude the "misfit." Another important problem which is to some extent bound up with this is the effect of acclimatization. It may be that a process of artificial acclimatization would help to fit a man for service in climatic extremes.

All these and other problems are ripe for research. The advances which have already been made in the problems involved in fitting man to his environment have been outlined, and some of the outstanding problems which require investigation have been mentioned. Though the study of habitability has been largely confined to ships by reason of immediate wartime requirements, the problems are equally applicable to life ashore, with additional factors such as the special requirements of the female sex.

DISINFECTION, DISINFESTATION AND THE USE OF INSECTICIDES

As the result of recent advances in the knowledge of the methods of spread of disease and the discovery of powerful insecticides, the old time laborious procedures for disinfection and disinfestation have been greatly modified.

Disinfection of quarters after a case of infectious disease no longer requires stripping and fumigation. All that is needed in most cases is thorough ventilation and washing with soap and water. If the disease is one of the insect borne variety such as typhus or plague, spraying with liquid D.D.T. should be [illegible]

For the disinfection of bedding and clothing simple laundering is all that is required for most infectious diseases, though a preliminary soaking in disinfectant fluid first is necessary for the most virulent type of organism such as typhoid or cholera. Steam disinfection can be limited to the more resistant and dangerous types of organism such as smallpox. Treatment with D.D.T.

possible [illegible] case of typhus fever or plague [illegible] disinfestation of all things, including [illegible] is the danger [illegible] carried in this way but by intimate personal contact.

The story of D.D.T. is too well known to need description here but its application to naval service in addition to that already mentioned can be summarized. Its discovery has eliminated the need of fumigation of large ships by hydrocyanic acid gas except for infestation by rats, and of carbon [illegible] fumigation of submarines. The immense advance in the control of insect-borne diseases by the use of D.D.T. was demonstrated abundantly in the war and was particularly applicable to the control of malaria, sandfly and dengue fever at naval air stations and shore establishments in the Tropics. The elimination of the plagues of flies and the resultant decrease in intestinal diseases was remarkable. Aerial spraying of D.D.T. was carried out by naval aircraft with marked success. The proper use of D.D.T. has enormously reduced the ever-present scourge of cockroaches in ships, and the occasional menace of the bed-bug has been eliminated.

To anyone who has had personal experience of living ashore in hot climates the difference in conditions of living compared with pre-D.D.T. days is nothing short of miraculous, and when control is of a high order flies, sandflies, mosquitoes, cockroaches and other pests are almost non-existent. Fly-proofing of buildings in the Tropics, which does so much to impede ventilation, is now of doubtful necessity. However, it should be remembered that, whatever its excellence, D.D.T. must never be a substitute for good sanitation practices.

Research has been carried out recently in the Navy with different insecticides with the object of finding a suitable substitute for D.D.T. in kerosene solution which has obvious disadvantages. Activated D.D.T. emulsions and emulsion paints designated as A.F. 34, A.F. 35 and A.C. 3 were tried out. A.F. 34 is of most use against flies, sandflies and mosquitoes (fly and larva) and A.F. 35 is of most value against cockroaches. The knock-down rate, the residual toxicity and the quantities required all show a marked improvement as against the previous D.D.T. preparations. An aerosol system producing a continuous phase D.D.T. aerosol by means of electrical volatilization of D.D.T. controlled by the thermostat has been tried out with most satisfactory results. These preparations may provide an outstanding advance in pest control though the expense factor will have to be considered.

Specific Diseases in Relation to Hygiene

(1) *Malaria.*—By virtue of the protection afforded by life afloat on only rare occasions have severe outbreaks of malaria occurred in the Navy. In the War, however, the necessity for setting up air stations and shore establishments—often in highly malarious districts—made the menace of malaria one of vital concern. The previous happy immunity of the sailor required a painful and laborious propaganda of indoctrination in anti-malaria discipline ashore, and before this could be inculcated high casualties were suffered.

The cardinal points of malaria control, siting of the living quarters away from native habitations, routine mosquito and larva control with insecticides and personal protection in the form of mosquito netting, repellents, adequate clothing after dark, and the strict daily intake of suppressive mepacrine when necessary, were learned at last. The Navy had become "malaria minded," and the incidence of disease at once fell to insignificant proportions.

The discovery of D.D.T. vastly simplified and made more effective the control of malaria, and the method of mosquito and larva control by aerial spraying was adopted by the Navy with good results. The discovery of the value of mepacrine in preventing the onset of malignant tertian malaria and in suppressing benign tertian was one of the greatest achievements in preventive medicine and reduced the casualty rate from malaria in the south-west Pacific from 90 per cent. to less than 5 per cent. This achievement was possible only by making the Commanding Officers responsible for anti-malaria discipline with the doctor as adviser.

(2) *Typhus fever.*—The incidence of pediculosis increased considerably during the War under operational conditions of overcrowding in ships with lack of opportunity for proper washing and dhobeying.

Outbreaks of typhus fever became a possibility especially when H.M. ships were used for transporting internees from Russia to the United Kingdom. Epidemics in the Mediterranean following enemy evacuations also constituted a danger to the Navy. Reliance for control had been placed on careful routine inspections for lousiness, and treatment by anti-louse powder and disinfection of clothing. With the advent of D.D.T. the control was much easier and more effective. The impregnation of clothing with D.D.T., though carried out extensively by the Army, was not considered necessary for the Navy, though the method was always available if required. Vaccines were available for preventive inoculation.

Scrub typhus.—Though more a concern of the Army, outbreaks occurred also among naval personnel in the war. Control consists in the careful choice of camping sites, the burning of scrub country where possible, and in personal protection. For this last purpose a repellent—dimethyl phthalate—also used as a mosquito repellent, was highly effective against the mite when rubbed into the socks and bottoms of the trousers. Another repellent—dibutyl phthalate—was a more efficient mite repellent but had certain disadvantages. Both of these preparations were available to the Navy. Research work for an effective vaccine for preventive inoculation was carried out.

(3) *Yellow fever.*—The decision to form large naval bases on the west coast of Africa during the war made the danger of yellow fever one of vital concern, for not since the early part of the nineteenth century, when a squadron was stationed off this coast to suppress the slave trade, had the menace of "Yellow Jack" been so great.

The necessity for full anti-mosquito control and inoculation against the disease was essential. In addition the increase and range of aerial communication made the possibility of conveying infected mosquitoes and patients incubating the disease to other parts of the world as yet free from yellow fever a very real one. The strictest measures for inoculation of travellers and the disinsectization of aircraft passing through endemic areas were necessary, and once again D.D.T. proved of the greatest value in mosquito control.

(4) *Dysenteries.*—Adequate sanitation, the provision of a pure water supply and the elimination of flies were of supreme importance in the control of intestinal diseases during the war. The sailor afloat had little cause for anxiety on this account, though there is need for investigation into the numerous outbreaks of "diarrhœa" which occur in ships from time to time, the origin of which is as yet obscure.

Ashore, especially in camps and establishments hastily set up in insalubrious places in the tropics, the Navy had to learn the Army's ways of camp sanitation, chlorination of water, and disposal of excreta and refuse. Greater care in the cooking and preparation of food, and control of the fly menace had to be exercised, all of which necessitated much propaganda and ceaseless vigilance. Afloat, the Frederick E.C.D. water sterilizer was fitted to all ships from sloops upwards wherever possible; for field use Halazone tablets were found efficient for sterilizing water.

The control of flies was vastly simplified by the use of D.D.T., which undoubtedly reduced the incidence of intestinal diseases, though it is too early yet to assess the full measure of success from its use alone.

The use of sulphaguanidine for bacillary dysentery was of great value as a prophylactic as well as a curative drug. Since its use, bacillary dysentery has become a mild disease and sources of pollution and infected stools are greatly reduced.

(5) *Smallpox.*—Isolated cases occurred during the war, but there were no epidemics, and it can be assumed that the general state of vaccination in the Navy is satisfactory. Control of the importation of smallpox into the United Kingdom was especially necessary during repatriation by air after the war; this was carried out by the registration and the issue of special cards to all who travelled by air, and was of use in tracing contacts and reporting the occurrence of a case.

Recent advances in the control of smallpox are indicated by the reduction of the period of re-vaccination from five to three years, and proposals for the reassessment of the type of reaction in order to ensure a successful vaccination. The proposed introduction of the intradermal method of vaccination should eliminate the incidence of "bad arms," and a tightening up of the requirements for the use and storage of lymph has been made. Diagnosis by the microscopical method has proved of use in doubtful cases.

(6) *Pulmonary tuberculosis.*—The pioneer work of the Royal Naval Medical Service in mass fluorography has developed considerably, and apparatus has been installed at the home ports and elsewhere. It is hoped that, in addition, travelling units will be available shortly, and when the supply position has improved installation of apparatus abroad will be required.

The number of "pick-ups" of cases of pulmonary tuberculosis has been considerable, and with the possibility of very early treatment this has meant that a proportion of cases have been able to return to duty. Thus these cases as a possible source of infection can be brought under control at an early date.

Facilities for these [illegible] have been extended to Admiralty civilian personnel and [illegible] will be a routine periodic examination of all naval and Admiralty personnel. It is hoped that successful control of pulmonary tuberculosis in the Navy can be achieved by these means. The work of the different fluorographic units over recent years has been one of the greatest advances in preventive medicine.

(7) *Venereal diseases.*—The problem of prevention of venereal diseases still remains acute. The adoption by the Navy of the provisions of Regulation 33B for the detection and enforced treatment where necessary of the consort has led to a large number of sources of infection being traced and reported to the local health authorities. It is hoped that in time this will produce a reduction in the incidence of venereal disease in the nation which will be correspondingly reflected in naval figures.

Droplet Infections in Relation to Accommodation

The trivial complaints such as colds, sore throats and uncomplicated influenza are probably the biggest factors in the loss of man power in the Service. Together with other infectious diseases caused by droplet infections their control constitutes one of the great problems of preventive medicine.

During hostilities the Navy was forced to accept, though most reluctantly, austerity scales of accommodation ashore far below the recognized safe limits. Owing to the acute shortage of materials and labour it is not yet possible to return to peacetime standards, far less to improve upon them. An interim scale of accommodation at home for dormitories allowing of only 45 sq. ft. per head for ratings, but with not less than 6 ft. between bed centres, has had to be accepted. Slightly more generous scales for abroad have been provided. Proposals for peacetime scales on a more lavish basis have already been considered for the future.

Conditions were, of course, infinitely worse afloat than ashore, and it may seem remarkable that very few major epidemics of diseases due to droplet infections occurred. However, there are various factors such as the effect of the forced ventilation system in ships which are not properly understood yet, but may have an important effect in reducing the incidence of epidemics; other factors of herd immunity also probably come into the picture. Nevertheless the rise in incidence of pulmonary tuberculosis from 2 per thousand to 2·8 per thousand, in spite of the identification by mass radiography of previously unrecognized cases, must always be remembered.

The introduction of air conditioning and the provision of laundries and other amenities in ships may do much to reduce the incidence of air-borne diseases, though there are many epidemiological problems in this connexion, which have been indicated under the section on habitability, that require an answer before any definite opinion can be given.

There is an enormous field open for research into the problem of air-borne infection in warships; this has already begun, using the slit sampler for obtaining bacterial counts. As the result of further work it may be possible to lay down standards of bacterial [illegible] to different [illegible] compartments in varying conditions [illegible].

Research work in the control of [illegible] especially in training establishments with a high [illegible] these diseases is urgently required. Some advances have already been made in trials in naval barracks of thermostatically controlled chemical bactericides in the form of aerosols, but the results have been inconclusive. The use of oils such as spindle oil to control dust in dormitories requires consideration.

FEEDING

The feeding of the Navy during the war left little to be desired considering the difficulties which had to be overcome and no adverse effects on health can be attributed to deficiencies in diet. Recent advances in refrigeration and dehydration methods enabled supplies of meat and vegetables to be provided even on long cruising operations.

Reports were received from time to time, especially from small ships operating in northern waters, of ill health and symptoms such as bleeding gums which were considered to be subclinical or pre-scurvy states. Critical examination in no case substantiated this theory, although additional supplies of vitamins in capsule form were supplied to ships in these areas in case of emergency. As lime juice contains almost no vitamin C, the routine issue was replaced by a lemon powder rich in this vitamin.

Supplies of fresh fruit and vegetables were hard to obtain in many instances of course, but big advances in the variety of the diet in ships will be forthcoming when the proposals to provide cold storage for fruit and vegetables, cold water drinking fountains and ice cream machines can be implemented.

RODENT CONTROL

The ravages to material and foodstuffs by rats and mice is enormous, which caused grave concern during the war, and the Services were asked by the Ministry of Food to co-operate in a nation-wide campaign to eliminate the menace. Surveys of rodent infestations of all naval establishments at home were carried out, and modern methods of destruction by the use of poison baits were adopted.

It is hoped that uniform methods will be adopted shortly in all commands employing mobile civilian squads trained in the latest scientific technique to carry out a continuous work in rodent destruction. Similar schemes will have to be considered for abroad, where the problems of plague and other rat-borne diseases are more urgent. This will be a big advance on the former haphazard and primitive methods of the rat catcher and the obsolete yearly rat week. Poison bait technique can also be used successfully in ship infestation and may obviate the laborious and costly method of fumigation by hydrocyanic acid gas.

PULHEEMS SYSTEM OF MEDICAL CATEGORIZATION

The adoption of this system by all the Services is an advance of the first order in the utilization of man power to the fullest advantage to select the right man for the right job, and can be included appropriately under the aims of preventive medicine. This system of medical categorization will doubtless be extended in the light of experience and will be found of great value in industry and in the selection of men and women for all types of employment.

Classification under this system is based primarily on function—bodily and mental—i.e. the capacity for a man to perform the work entailed in a particular duty. The misfit can be avoided. The correct assessment of the capacity for duty in different extremes of climate will greatly reduce the waste which occurs when a man drafted abroad is invalided home almost on arrival from a cause which could have been determined at the original drafting examination.

INDUSTRIAL MEDICINE AND HYGIENE

The importance of industrial medicine and hygiene in the Navy has developed enormously of recent years as the result of an increasing "industrialization" of the Service. Industrial medicine in the Navy, especially from the preventive aspect, will assume an ever increasing importance, and an appreciation of the problems involved and a knowledge of the means of prevention of occupational diseases are essential.

The modern warship, naval air stations and other fleet shore establishments which deal with the use and development of scientific processes, are factories to all intents and purposes. The Royal Dockyards employing large numbers of civilian industrial workers carry out a very wide range of industrial work. During the war a number of special ships were fitted for repair work such as aircraft engine and aircraft component repair ships, heavy repair ships, &c. These ships were equipped with a great variety of processes able to deal with all forms of repair and manufacture. Many new developments have resulted from the intense research carried out during the war, these often requiring the use of compounds which are frequently highly toxic, and a number of cases of poisoning have occurred as a result.

Recently a Joint Services and Factory Department Medical Committee on Industrial Medicine has been set up, on which there is a naval representative. This committee has proved of the greatest value to the Navy in the solution of many technical problems brought for advice, and in the exchange of information of common interest to all three Services and to the Factory Department.

STATISTICS

The information from which the annual reports *Health of the Navy* were compiled was obtained chiefly from medical officers' journals. This provides for long term statistics, but does not give any information about a host of minor illnesses, which are shown only on the attending list but which are the predominant cause of loss of man power in the Service. Attending list cases probably provide a more accurate index of inefficiency due to adverse living conditions.

The introduction in 1945 of the new form of return of sickness rates from ships is valuable for obtaining immediate accurate returns by which sickness rates in different ships serving under varying climatic conditions can be compared. It will be of great value in the assessment of the effects of air conditions on health and the habitability of ships in extremes of climate.

TRAINING

"The most important medical lesson learnt in the War is that executive and combatant officers must be taught that the enforcement of hygienic measures to preserve the health, morale and fighting efficiency of their troops is as important as any other military duty." (Address given by Surgeon Vice-Admiral Sir Sheldon Dudley at an Inter-Allied Conference on War Medicine convened by the Royal Society of Medicine.)

This lesson has been taken to heart and the responsibility has been placed squarely on the shoulders of the Commanding Officers (A.F.O. 1264/45). It is fair to say that, as a result, the Navy has become hygiene minded.

In order to drive home this lesson it is necessary to incorporate instruction in hygiene as part of the basic training of all personnel. This training should take the form of a series of lectures implemented by teaching from films and film strips, and field training for certain branches such as the Royal Marines whose duties may approximate more nearly to those of the Army. Such training should be continued throughout a man's Service career as opportunity offers. Proposals to this effect are now being considered.

During the war, reliance had to be placed on the Army for hygiene training facilities, and large numbers of officers, ratings, R.M. ranks and Sick Berth staff were given courses at the Army School of Hygiene at Mytchett, while special courses were given to medical officers. Courses in hygiene were given later with great success from naval sources at the air station at Middle Wallop. If these advantages are not to be lost the time has come when the Navy should equip itself with the necessary facilities to carry out its own training.

CONCLUSION

An attempt has been made with the space at my disposal to outline in brief some of the recent advances in naval preventive medicine and hygiene during the past few years. As a result largely of the impetus of the War, these advances must be considered as notable, and in some instances of such far-reaching importance as will have a profound effect on the health and welfare of the Navy.

Opportunity has been taken to indicate something of the problems still to be solved and the research which has been initiated and must be continued. An enormous variety of problems of fundamental importance remains to be elucidated and offers a future rich in opportunity.

NOTES ON RECENT ADVANCES IN THE TREATMENT OF PSYCHIATRIC CASES

BY

Surgeon Lieutenant W. CULLEN, R.N.

I.—INSULIN SHOCK THERAPY

INSULIN has been used for many years to quieten patients suffering from drug addiction, chronic alcoholism, and in small amounts to increase the appetite and [illegible] processes. In 1928 Sakel in Vienna [illegible] improvement in the patient's mental state while using insulin to [illegible]. He decided to follow up this idea and, in 1933, insulin shock therapy for the treatment of schizophrenia was introduced.

The treatment consists essentially in the giving of gradually increasing doses of insulin daily until finally producing hypoglycaemic coma. Once this dose has been ascertained [illegible] and sharply defined coma is induced daily which is allowed to continue for approximately half an hour and is then terminated by giving glucose either by nasal catheter or intravenously.

Treatment Routine.—The following routine is commonly used:—

Treatment is given on five or six mornings weekly. The patient is allowed to eat nothing following supper on the preceding evening until after coming out of coma.

The insulin (soluble) is given about 7.30 a.m., the commencing doses being generally about 20 units, and the amount given is slowly built up until coma is induced at about 10 a.m. Once this stage has been reached the patient appears to become gradually more sensitive to the action of the insulin, which is then reduced so that finally regular comas may be induced by half the initial coma dose. The average requirement varies between 100 and 200 units of insulin, but figures both larger and smaller have been recorded, and satisfactory states have been induced on 60 units while others have required 300.

The length of the coma period allowed is commonly about half an hour, but periods both shorter and longer than this have been advised. Prolonged coma has many advantages: it appears to produce a recovery more quickly, but, on the other hand, it calls for extreme care and skill on the part of the "team" and complications (e.g. cardiac collapse) are more common. Others have advised short, deep coma induced by small doses of insulin given intravenously; in these cases the patient should awaken spontaneously without glucose. It has also been recommended that the treatment should stop just short of coma (Benn's method).

After the insulin is injected, there follows first a stage of somnolence, usually accompanied by marked sweating and twitching. Following this there is a slow transition to a soporose state, with loss of normal response to speech and painful stimuli, and this gradually merges into the coma stage, when there is loss of all purposeful response. Once the patient is in coma, he is given 1/100 grain atropine sulphate to dry up bronchial secretion which may hinder respiration, and the predetermined coma is terminated by giving either one pint of glucose tea by nasal catheter (plain tea sweetened with glucose so as to approximate to a strong glucose solution) or a 33 per cent. dextrose solution intravenously.

When the patient awakens he is encouraged to eat and drink as much as he wishes, and is allowed to get up about one hour after consciousness is regained. He should be as active as he can be, both mentally and physically; he can take part in all ward routine and occupational therapy, and can play games. The only pastimes barred are those where a sudden collapse might be fatal, e.g. swimming. In all patients undergoing this treatment there is a liability to 'after-shock' later in the day due to a recurrence of [illegible] or even coma. If this occurs it can be easily controlled by [illegible] in any form. For this reason these patients must be [illegible] and a close check kept to make sure that they are not hiding [illegible] symptoms or refusing meals.

The treatment is generally carried out in a separate [illegible] the main ward may be used if a reasonable temperature [illegible] obtained. From experience it has been found advisable to [illegible] and end-boards to the beds as patients often become excited and restless whilst under the influence of the insulin.

Accurate and careful records of temperature, pulse and respiration must be kept throughout the treatment period and the medical officer must be informed at once of any change in any of these figures. The temperature tends to fall slightly during coma. Therefore the treatment room must be kept warm. A fast or irregular pulse, laryngeal spasm, persistent hyper[illegible] [illegible] in wild excitement together with epileptiform fits and cardiac or other weakness are all signs for immediate interruption of the coma.

Selection of Patients.—It has been found that early acute cases of schizophrenia are the ones most likely to benefit. The longer standing and more chronic the case the less likely it is to benefit by this treatment. Cases must be in good physical condition and any septic foci attended to before treatment commences. For this reason all such patients should be seen by the E.N. & T. Specialist and the dental officer and an X-ray of the chest carried out to exclude pulmonary tuberculosis which tends to flare up with the treatment.

The patient's previous personality and intelligence also must be carefully estimated. In such a treatment which is strictly limited in action and scope by the call it makes on the medical and nursing staff, no one of poor personality or of limited intelligence can be considered suitable; the preference for the use of the limited beds must be given to the acutely ill schizophrenic whose intelligence and personality were such as to promise a useful citizen after recovery.

The physical contra-indications to treatment may be summarized shortly as to include any physical condition which would make it undesirable for the patient to accept a general anaesthetic.

Complications.—The commonest complication is epileptic fits. This calls for no special action and may even be considered desirable if occurring in moderation. It is now a common practice to combine electro-convulsive therapy and insulin shock therapy, giving the convulsion while the patient is in coma. If he is having more than two or three fits a week, however, it is desirable to control these by the administration of luminal or other barbiturates.

Acute cardiac failure may be seen in the course of treatment. This should be treated symptomatically and the patient brought out of coma at once with intravenous glucose. However, it occurs for the most part as the patient awakens from coma and calls for no special treatment.

Prolonged coma is seen from time to time and in these cases, though glucose is given in large amounts, the cells of the cerebrum appear to be in activated by the insulin and unable to utilise the glucose in order to carry on their normal functions. This is best treated by glucose and fluids in large amounts given—both nasally and intravenously—by large doses of vitamin B and by lumbar puncture. Cardiac stimulants also may be necessary and should be given as required.

Pathology.—The most marked change noted is the sharp and sudden fall in the blood sugar level. The blood sugar falls to a minimal level during the hour and a half following the administration of the insulin and a slow rise then follows. The clinical signs of hypoglycæmia do not occur concurrently with the changes in the blood sugar level, and it is now considered that such signs appear when the sugar is withdrawn from the brain cells into the blood stream to compensate for the sudden fall in the blood sugar level. It appears that epileptiform symptoms are most likely to be seen when the difference between intra- and extra-cellular sugar levels is most marked.

Results.—In carefully selected cases, a recovery rate of up to approximately 70 per cent. may be seen, taking five years as the period of satisfactory mental health indicating recovery. The results are very variable, however, and much depends on the standard which is accepted as indicating recovery.

As with electro convulsive therapy, results better than those obtained with civilian schizophrenics have been seen in Service personnel of the same age-groups. This is probably due to the fact that the men are living under much greater stress than is normal in civilian life. The length of the course of treatment varies widely and may commonly consist of from thirty to forty comas. The only criterion is the clinical response of the patient.

CONCLUSIONS

Insulin shock therapy gives satisfactory results in cases of acute schizophrenia. The prognosis is largely dependent upon the previous personality of the patient and on the duration of the illness. A person with a previously open and frank personality whose illness has lasted only months achieves the best recovery, and the prognosis deteriorates rapidly when the illness is of more than nine months' duration.

It is, however, a prolonged and time consuming form of treatment, requiring a highly skilled nursing staff and medical attention much beyond the generally accepted proportion to the number of patients under treatment. The mortality is normally accepted as being about 1 per cent., and the treatment carries a definite risk to life, so it should not be considered as a mere placebo.

II.—ELECTRO CONVULSIVE THERAPY

Convulsive therapy was introduced in the late 1920s by Ladislaus von Meduna, who recommended giving a 25 per cent. solution of camphor in oil to induce convulsions artificially in schizophrenic patients. He based the rationale of this treatment on two factors, namely, that spontaneous convulsions in schizophrenia were followed by remission and that epilepsy and schizophrenia rarely occurred together (Glaus (Zurich, 1931): 8 in 6,000 cases).

This method produced useful results, although the injection was painful, tend to produce abscesses at the site of injection and was very difficult to control in that the time of onset of the fit could not be predicted with any accuracy. Camphor was discontinued quickly therefore and cardiazol (metrazol)—which has the same pharmacological effect, is soluble in water and suitable for intravenous use—was substituted. This method had disadvantages as in many patients it produced an acute anxiety amounting to a feeling of imminent death between the injection and the convulsion and it was consequently difficult to persuade patients to accept treatment. A third method of inducing convulsions is widely used to-day: electric shock therapy was introduced by Cerletti and Bini in 1937, this consisting of induction of fits by the use of alternating current conveyed to the patient by electrodes placed on the skull.

There are many forms of apparatus available but only three types are in common use:—

(1) The Solus machine, which is manufactured according to the original specifications of Cerletti and Bini.

(2) The Ediswan, made according to Grey Walter's specification.

(3) The Strauss McPhail (St. Bartholomew's).

All of these have modifications and variations but any machine is suitable which can deliver an alternating current at a specified voltage for a specified time and measure the resistance of the patient's skull. The current is conveyed to the patient by means of metal electrodes covered by chamois leather or gauze placed over the fronto-temporal region slightly above and in front of the ears. The electrodes are pressed tightly against the skin by either a heavy leather headband or a wide rubber band.

Technique.—The patient is placed on a bed or couch after he has been dressed in a loose-fitting garment or all constricting bands of his regular clothing have been loosened; the skin over the temples is cleaned with ether soap and the electrodes applied. His resistance is measured, the appropriate voltage and time are selected and then the shock button is pressed. Immediately or after a very short delay the patient goes into a fit which is typical of the *grand mal* type. Treatment is usually given in the morning two or three times a week. Bowels and bladder should be emptied, all metal objects and dentures removed from the head, and no food taken for at least three hours prior to treatment.

This is a typical routine although many minor variations of this procedure are used.

Modifications. (1) *Drugs.*—(*a*) As a routine the treatment is now preceded by an injection of 1/100 grain atropine sulphate to minimize any chance of vomiting and consequent aspiration of material into the lung and also to dry up bronchial secretions which may cause difficulty in breathing after the convulsion.

(*b*) Some workers also recommend pre-sedation of the patient by barbiturate or other sedative, e.g. paraldehyde, but this is generally considered inadvisable and unnecessary as a higher milliamperage must then be used to induce a convulsion.

[illegible] recommended to lessen the deep [illegible] after the fit (Whitteridge 1947).

[illegible] Recently the use of curare and curare-like drugs to soften the convulsion in electro-convulsive therapy has been advised by several workers (H[illegible] and Prescott 1947). Curare itself, however, produces such fear and apprehension in the patient that further premedication with pentothal or paraldehyde has been advised.

This method has very definite advantages as it extends the types of patients suitable for convulsive therapy; this is done by diminishing the strain on the cardiovascular system and controlling the violence of the fit, so allowing hypertensive, arteriosclerotic and senile patients the benefit of this treatment. Pregnancy is not considered a contra-indication with this routine.

(2) *Other modifications.*—It is now considered essential that this treatment be given on a hard bed or couch with the spine hyperextended over a cushion or pillow. The jaw should be carefully controlled throughout to prevent dislocation and a suitable gag inserted to prevent any damage to the tongue. A length of stout rubber tubing covered with gauze has been found very satisfactory.

Various types of jackets and harnesses have been recommended for controlling the convulsive movements of the limbs, but these are now considered unnecessary.

Contra-indications and Complications.—Cardiovascular disease, abnormal lung conditions, pregnancy and febrile conditions were previously counted as contra-indications, but with the latest modifications, e.g. curare and oxygen, the contra-indications are so few as to be negligible, and in most cases the risk is worth accepting in view of the improvement which may be expected.

The most common complications are fractures and dislocations, but the frequency and severity of these are largely dependent upon the skill of the team carrying out the treatment. Cardiovascular collapse occurs but is usually transient and is regarded by many investigators as the result of an acute temporary dilatation of the heart due to exhaustion and anoxaemia.

No mental deterioration has been seen yet following convulsive therapy, although a transitory memory defect immediately after a convulsion is seen frequently. Epileptic seizures have occurred on rare occasions some hours after treatment.

It is considered desirable that a thorough physical examination with X-ray of the spine should be made before treatment is commenced, to prevent any possible medico-legal sequelae.

Pathology.—Electro-encephalographic examination has shown changes in the record after a course of treatment similar to that shown in convulsive states, but these are short-lived and the record quickly returns to normal. During the convulsion the record shows first a continuous display of maximal activity (successive spikes) followed by a period of bursts at longer and longer intervals (clonic phase), after which there appears to be a period of exhaustion and minimal activity.

No organic changes have been reported with electro-shock therapy, but [illegible] phenomenon.

Choice of [illegible] and [illegible] [illegible] gives best results in affective illnesses, especially of the [illegible] type occurring in the involutional period, and in this type of case the results [illegible] been described as "brilliant." Schizophrenic patients [illegible] those suffering from illnesses of the obsessional type [illegible] although the improvement is generally less [illegible].

The following figures from [illegible] hospital are typical of the results which are obtained:

		[illegible]	[illegible]	[illegible]	Neurosis
Treated		18	1[illegible]	[illegible]	
Recovered	left hospital	1	[illegible]		1
Relieved		10	1	5	1
Improved	in hospital	[illegible]		[illegible]	—
Unchanged		4	1	6	

The above results are satisfactory on the [illegible] but unfortunately in many cases, especially in the schizophrenic illnesses, all that can be claimed eventually is a fairly short lived remission, and the figures on the whole for true cure recoveries are poor in this group. In the depressive illnesses the results are much better, but in any case a remission is generally seen in these cases and all that can be claimed is that this treatment hastens and increases the onset and scope of the remission.

It is interesting to note that cases of schizophrenic breakdowns among hostilities only ratings tended to recover more completely than did similar cases among civilians of the same age group.

More recently it has been considered that electro convulsive therapy depends largely on the spacing and frequency of treatments. Mere mechanical twice weekly applications are said to be of little avail and each case must be considered individually and the number and frequency of the convulsions adjusted accordingly. With this method much better results are seen, and as an example may be quoted the marked improvement seen in obsessional cases with "concentrated E.C.T." where many fits are induced within a comparatively short time. The number of convulsions ultimately depends on the clinical response of the patient.

CONCLUSIONS

Electrical convulsive therapy is a useful measure in the hands of the psychiatrist and does produce recovery even though this is short lived in some cases. It can be used in out patient departments, thereby avoiding admission to hospital and dislocation of the patient's life and business. The method of operation is relatively simple and is without serious risk to the patient.

Finally th[illegible] the treatment is such that the patient can be easily induced [illegible] short course to stabilize his condition should he feel that this [illegible]

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Clinical Notes and Cases

A CASE OF "MARBLE-BONE" DISEASE

BY

Surgeon Commander M. A. RUGG-GUNN, R.N.

Case History.—P.O. Wren, aged 23.

This patient came to see the E.N. & T. Specialist at R.N. Hospital, Haslar, in January 1947, complaining of symptoms suggestive of early sinus trouble, and as a result her skull was X-rayed. It was then realised that she was suffering from some sort of generalised bone disease, and so her entire skeleton was X-rayed. She had no other complaints whatsoever.

The patient was born in Germany, her father being an Englishman in the Army of Occupation and her mother a German. From the age of 7 until she was 12 she lived in Egypt and later in Jamaica, where she had three attacks of dengue fever. She returned to this country in 1940. The patient denied any other illnesses and had never sustained a fracture.

Her father was believed to be healthy, though his exact whereabouts were not certain. Her mother had no definite complaints, but had suffered from time to time from rather vague rheumatism. There was one sister, aged 18, alive and well. Details of the mother's family were really unknown, as contact had been lost with them since the outbreak of the War.

Clinical examination was entirely negative, except possibly for slight bossing of the skull and prominent temples, but this was not striking, and had not been noticed or commented on before. However, she did volunteer the information that certain members of her mother's family had a high forehead and prominent temples. The skeletal system appeared perfectly normal on palpation. The teeth were good, and the palate within normal limits, and there was no splenomegaly or enlargement of the lymph glands.

Investigations were carried out, with the following results:—

Wassermann reaction negative.

Serum calcium 15 mg. per 100 c.c. of serum. (This was repeated a week later and confirmed.)

Serum phosphorus 4.9 mg. per cent.

DISCUSSION

Marble bones, or Albers-Schönberg disease, is a rare condition of unknown etiology characterized by an increase in the radiographic density of the bones though at the same time their contour is preserved. In addition to the increased density the bones have a homogeneous appearance due to the laying down of some material of high calcium content in the medullary cavities which become obliterated; the differentiation between the inner and outer tables of the skull is likewise lost.

The condition was first described by Albers-Schönberg in 1904, when he studied and recorded the X-ray changes in a man of 26, the bones being dense and the medullary cavities obliterated. The patient was intelligent and healthy and had had no previous illnesses of note, and at that time he had no specific complaints. He was re-X-rayed in 1915, by which time his mental capacity is said to have diminished markedly and he looked very pale.

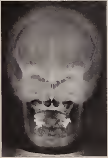


FIG. 1

[illegible] and [illegible] it is probable that many more will come to light. The disease is essentially familial and changes have been demonstrated in even the foetus. Kelley ([illegible]) described four cases occurring in the third generation.

The exact pathology is in doubt. According to Pirie (1930) the changes start in the diaphysis and spread to the epiphyses after puberty, and that the

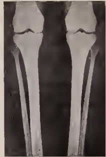
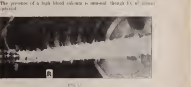


FIG. [illegible]

[illegible] and fully [illegible] and [illegible] with [illegible] certainly the [illegible] changes [illegible] in the rapidly growing extremities of the bones, but the question of hardness or otherwise is still in doubt. Henderson (1927) of the Mayo Clinic states that they are abnormally hard, a fact supported by Bradford ([illegible]) who suggests that they are fragile in childhood but become hard later, and certainly spontaneous fractures seem to be rare.

It is of interest [illegible] to that the disease is [illegible] that this girl had a German mother unfortunately [illegible] [illegible] were available for examination. In many [illegible] similar to the original case in being in her twenties [illegible]. However the progress is far from good [illegible] in the skull tend to damage the cranial nerves and the [illegible] bone marrow leads to a progressive anaemia. It is pointed out that [illegible] nothing to suggest the presence of chronic lead poisoning [illegible] syphilis.

The presence of a high blood calcium is unusual though [illegible] exceptional.



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THE EFFECT OF PENICILLIN IN A CASE OF SEVERE INJURY TO THE EYE

BY

Surgeon Lieutenant-Commander J. A. N. LOCK, R.N.

Case History.—Dockyard carpenter, aged 14.

On 28th August, 1947, whilst using a hammer and punch the patient felt something hit his left eye. [illegible] but there was no pain. He was admitted to R.N. Hospital, Plymouth [illegible] the same day, when examination revealed right vision 6/[illegible], left 6/[illegible]. [illegible] a large hole in the [illegible] behind this. The lens behind the iris tear was opaque and [illegible] extended into the pupillary area.

Ophthalmoscopy [illegible] mass behind the iris at the site of the tear which did not extend [illegible]. The rest of the fundus was normal. X-ray showed [illegible] foreign body in the [illegible] side of the eye not as far back as the equator. This foreign body [illegible] t 1600 the same afternoon [illegible] using the giant magnet (HAAB) [illegible] firmly stuck to the retina about 3 mm behind the limbus [illegible] lens and the iris and came out immediately through the original [illegible] steel measuring 3 mm by 1 by ½ mm. Penicillin drops and 1 per [illegible] instilled and the patient returned to the ward.

29th August [illegible] opacity much the same. Atropine 1 per cent and penicillin drops [illegible]

30th August [illegible] lens. There was increased lens opacity with increased lesion [illegible] 1 per cent t.d.s. and diathermy started.

P.m. the lesion [illegible] pupil contracted and cornea clearer but the lens opacity was increased.

31st August a.m. the [illegible] painful with much chemosis. The lens was yellowish and there was corneal [illegible] of intra-ocular infection. Treatment was given by injection of crystalline penicillin [illegible] initially 100,000 I.U. in 5 c.c. water with 1 minim adrenalin [illegible] painful. (This injection is [illegible].) Atropine 1 per cent [illegible] bathing, two-hourly.

P.m. the pupil [illegible] three posterior synechiae but the cornea was clearer [illegible] penicillin then continued 50,000 I.U. in 0.5 c.c. water b.d. subconjunctivally [illegible] painful than previously.

1st September [illegible] appearance of pus in vitreous. [illegible] penicillin injections were repeated 50,000 I.U. [illegible] together with sulphadiazine [illegible] hourly.

2nd September [illegible] appeared to be localizing round the wound track. Repeat [illegible] penicillin dissolved in 5 c.c. of 2 per cent [illegible]

3rd September [illegible] Injection of 50,000 I.U. penicillin given in [illegible] 1 grm. t.d.s. Repeat sulphadiazine.

4th September [illegible] the A.C. was still clear. Repeat [illegible]

[illegible] September [illegible] the pupillary margin appeared bound down by [illegible]

[illegible] Consultant Ophthalmic Surgeon to Plymouth Royal Eye Infirmary [illegible] advised [illegible]

6th September [illegible] under local anaesthetic. The eye was [illegible] but the vitreous could not be [illegible]

[illegible] 8 o'clock and total posterior [illegible] about a quarter of the vitreous [illegible] tough stringy yellow pus with [illegible] the vitreous appeared to total.

[illegible] direct smear of pus show[illegible] numerous [illegible] cells. Fairly numerous Gram [illegible] shape. Cultures of the aqueous [illegible]

[illegible] was noted for four days [illegible] were kept in a Frigidaire [illegible] penicillin.

CONCLUSION

It is suggested that the penicillin definitely controlled the intra-ocular infection although at a stage too late to leave a useful eye.

My thanks are due to Surgeon Lieutenant Commander M. F. Sheehan, R.N., who carried out the laboratory investigations.

Reviews

Supplement [illegible] Medical Sciences [illegible] classified and [illegible] publication [illegible]

The publication [illegible] supplement [illegible] [illegible] catalogue [illegible] 1946

The price [illegible] Library is greater [illegible]

This catalogue [illegible] and to non-subscribers [illegible]

Pulmonary Tuberculosis [illegible] A Handbook for Students [illegible] Kerr M.D. [illegible] Medical [illegible] Sanatorium [illegible] M.R.C.S. [illegible] Matron [illegible] Assistant Medical [illegible] Miller [illegible] M.R.C.S. [illegible] Red Cross [illegible] Medical [illegible] National Resident [illegible] Second Edition 1946 Pp 277 + xvi [illegible] Edinburgh [illegible] Livingstone Ltd Price 17s 6d

The second edition of this handbook appears [illegible] well described

[illegible] problem [illegible] Navy [illegible] found clearly and [illegible] [illegible] high reputation of the author [illegible] the review of this little book [illegible] and their publishers

Elements of Surgery By Ernest Webb [illegible] First Edition 194[illegible] Pp 83 Geoffrey Cumberlege Oxford [illegible]

"Elements of Surgery" is an excellent book [illegible] student nurses and their Sister Tutors

Its contents [illegible] facts clearly

Wounds of the Head (War Surgery Supplement No 1—British Journal of Surgery) 1947 Pp 268 illustrated Bristol John Wright & Sons Ltd [illegible] 30s 0d

This is a *British Journal of Surgery* supplement and it is important to note that it is proposed to publish in the near future a series of such supplements [illegible] of war surgery The present publication is up to the traditional high standard of the Journal

There are 26 separate articles written by surgeons too well known to require commendations suffice it to say that Professor Lambert Rogers Professor [illegible] Jefferson and Sir Hugh Cairns head the list of distinguished contributors [illegible] say the Army provides most of the material by virtue of its weight of numbers [illegible] regrettable frequency with which naval casualties go down with their ships

The Supplement is well illustrated and many of these are accurately depicted in

Y

We acknowledge with thanks receipt of the following publications

Annals of Tropical Medicine and Parasitology; *Acta Medica Belgica*; *Australian Journal of Experimental Biology and Medical Science*; *British Journal of Surgery*; *British Medical Bulletin*; *British Medical Journal*; *Bulletin International des Services de Santé* [illegible]; *Chronicle of the World Health Organization*; [illegible] *Hospital Corps Quarterly*; *Journal of the Medical Association of* [illegible]; *Journal of the Palestine Arab Medical Association*; *Journal of the R.A.M.C.*; *Journal of the R.N. Scientific Service*; *Journal of the Royal Sanitary Institute*; [illegible] *Journal of Australia*; *Medical Press and Circular*; *Middlesex Hospital Journal*; [illegible] *St. Mary's Hospital* [illegible]; [illegible] *States Naval Medical Bulletin* [illegible] P 38)

◆

News of the Service

VISIT TO HONG KONG OF THE MEDICAL DIRECTOR-GENERAL

IN June 1947 the Hospital was honoured by a visit from the Medical Director General, who remained in Hong Kong for a fortnight. During this period inspections of the Royal Naval Hospital and other medical establishments were carried out and a crowded programme of engagements was fulfilled. This visit coincided with that of the Fleet Medical Officer and the Medical Officer in Charge, R.N. Hospital, so that no fewer than five Surgeon Captains were in Hong Kong at the same time.

ADMIRALTY FLEET ORDERS

2426a.—"Novox" Resuscitation Apparatus—Custody and Use

(M.D.G. 20788/47.—P.W. 05369/41.—4 Jul. 1947.)

The use by unqualified persons of the "Novox" apparatus, which delivers a mixture of oxygen and carbon dioxide under pressure, has led in occasional cases to untoward consequences, and in certain types of diving accident may be extremely dangerous. The apparatus is in future only to be used under the direct supervision of a medical officer.

2. The "Novox" apparatus is only to be demanded by and supplied to ships and establishments carrying a medical officer. All "Novox" sets held in ships and establishments in which no medical officer is borne are to be returned to the nearest R.N. Medical Depot or direct to Technical Assistant to M.D.G., R.N. Medical Depot, Risley, Nr. Warrington, Lancashire, on receipt of this Order.

3. B.R. 155/43 will be amended in due course.

2457.—Notation of Details of Diseases on Ledgers and Form S 47—Cessation—Form S 47 Revision

(N. 9258/45.—11 Jul. 1947.)

It has been decided that in future the practice of noting details of diseases on ledgers is to be discontinued. K.R. and A.I. Article 1718 is being amended accordingly.

2. Details of injury or disease should not be stated on Form S 47 (Sick Voucher) by [illegible] but an opinion given as to whether or not hospital stoppages under K.R. and A.I. Article 1565 are applicable.

[illegible] simple [illegible] officer [illegible] persons [illegible] together [illegible] particulars regarding [illegible] to be [illegible]

4. [illegible] the old [illegible]

5. [illegible] although [illegible]

(A.F.O. 3539/44 [illegible])

2469.—Vision Standard—Hostilities Only Ratings—General Instructions

(M.D.G. 15413/47.—11 Jul. 1947.)

The reference to "R.M. Engineers" in last line of A.F.O. 1873/47 is to be *cancelled*.

(*A.F.O. 1873/47.*)

2476.—Re-examinations of those Previously Found Normal at the Fluorographic Survey of the Navy

(M.D.G. 21282/47.—11 Jul. 1947.)

Whenever pulmonary tuberculosis is diagnosed at a naval hospital or establishment and it is found upon enquiry that the patient has been examined fluorographically in the past, [illegible] should be sent to the fluorographic department [illegible] the original examination was held, containing the following details:—

Name; Rank or rating and number; Fluorographic serial number (of the patient); Date of original fluorographic examination (see Naval Pay and Identity Book (S.43a)); Diagnosis; Date of diagnosis; Hospital.

2. In this way it will be possible to assess accurately the rate of development of fresh cases of pulmonary tuberculosis and thus to show whether, with time, the fluorographic survey reduces the incidence of the disease.

2478a.—Home Hospitals—Pay Allowances to Service Patients

(C.W. N.N. [illegible]/47.—11 Jul. 1947.)

The following amendment is to be made to A.F.O. 2402/46, paragraph 1:—

Diet:—

—	—	Boy ⁴	Apprentice or	7s. 0d.
Apprentice or	Boy	—	—	3s. 4d.

Subsistence:—

Apprentice	Boy	Boy	Apprentice or Boy	7s. 0d.
Boy	—			4s. 1d.

(*A.F.O. 2402/46.*)

2546.—Ratings and Royal Marines Other Ranks Unfit for General Service—Survey with a view to Invaliding

(N. 493/47.—18 Jul. 1947.)

Naval ratings and Royal Marines other ranks who are permanently unfit for general service but who have been retained under A.F.O. 2104/40 and A.F.O. 622/46 are now as a general rule to be brought forward for survey with a view to invaliding.

2. Any such men, however, who are employed in "key" posts and whose retention for the time being is definitely required may be retained (provided they volunteer to do so) for a period equivalent to the normal home service period for the post. On the completion of normal drafting, [illegible] therefore such men must be brought forward for invaliding.

(*A.F.Os. 2104/40 and 622/46.*)

[illegible] 1947 [illegible] 23 illustrations [illegible] Co [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

2639.—Royal Naval Medical Bulletins—Nos 21 22 and 23—Issue

(M D G 22710 47 —18 Jul 1947)

Royal Naval Medical Bulletins Nos 21 22 and 23 are ready for distribution [illegible] [illegible] obtained by all medical officers

The Bulletins will be supplied on demand addressed as follows —

For ships and establishments at home —

R N Store Depot

Elveden Road

Park Royal London N W 10

For ships and establishments abroad

The Local Naval Distributing Authority

2641.—Dope and Paint Spraying—Precautions

(N 6860 47 —25 Jul 1947)

[illegible] (naval or civilian) employed on doping work or in M T paint shops in [illegible] have a quarterly medical inspection irrespective [illegible] whether [illegible] [illegible] and [illegible] dope shops or not

[illegible] [illegible] of fumes is often not fully appreciated and [illegible] [illegible] [illegible] if strict precautions are not carried out

[illegible] [illegible] solvents [illegible] dopes [illegible] paint [illegible] [illegible] [illegible] headache and drowsiness which [illegible] [illegible] [illegible] [illegible] fatal results [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] (a) All doping and paint spraying [illegible] [illegible] [illegible] [illegible] the purpose except in the circumstances [illegible]

[illegible] The [illegible] used for doping should be maintained [illegible] 68 deg [illegible] 70 deg [illegible] and [illegible] should be capable of [illegible] changes [illegible] hour

[illegible] ventilation is necessary and the extracting fans [illegible] the [illegible] [illegible] and the [illegible] [illegible] [illegible] the opposite [illegible] [illegible] less than three times the total area of the [illegible] [illegible] blocking [illegible] the air inlets must not be [illegible]

[illegible] heated by means of [illegible] steam pipes and radiators [illegible]

[illegible] [illegible] should [illegible] back from the fan towards [illegible]

[illegible] [illegible] by means of a small booklet [illegible] [illegible] addressed to the R N Store Depot [illegible] N W 10 should be conspicuously displayed

[illegible] [illegible] should not be employed continuously on [illegible] [illegible] periodically to other work outdoors for preference

[illegible] [illegible] A special [illegible] milk [illegible] [illegible] [illegible] daily for all personnel—

[illegible] [illegible] doping [illegible]

[illegible] [illegible] the composition of the paint [illegible] [illegible] paint spraying is carried out are in the [illegible] [illegible] prejudicial to the health of the personnel

[illegible] [illegible] handling dope containers

For the [illegible] [illegible] 3d or the current price of a pint of milk [illegible] is the greater may be expended from public funds for each meal Bills for cha[illegible] the maximum amount [illegible] signed [illegible] Officer stating the [illegible] provided [illegible] the Supply Officer [illegible]

In [illegible] a free meal [illegible] the [illegible] this arrangement [illegible] except the [illegible] Ministry of Food [illegible] milk [illegible] be supplied [illegible]

The meal should in no circumstances be [illegible]

(e) *D[illegible]*—All personnel should [illegible] spraying.

(f) [illegible]—All the [illegible] the medical [illegible] will [illegible] any [illegible] should [illegible] will take [illegible] take place [illegible]

(g) Small [illegible] to [illegible] the [illegible] condition [illegible] operations [illegible] the health [illegible]

While [illegible] rather than [illegible] the [illegible] any [illegible]

4. All [illegible] Director General [illegible] should contain [illegible] the circumstances [illegible] each case.

5. When [illegible] the provisions [illegible] plant spra[illegible] spraying, slip

6. So far [illegible] concerned [illegible] Factories Act [illegible] 17 [illegible] Solution Regulations [illegible] be [illegible]

(A.F.O. 1606/4[illegible])

2686.—Civilian Non-Industrial—Sick Leave Entitlement of Officers [illegible] Forces—Revised Arrangements

(C.E. 11829/47.—25 Jul. 1947.)

Under [illegible] Section 45, paragraph 1, the [illegible] allowed to officers [illegible] is determined [illegible] sick leave taken in the relevant period (four years or 12 months [illegible]) enlistment.

2. It has now been decided that in cases where [illegible] officer's sick leave entitlement may be determined [illegible] sick leave taken [illegible] during the [illegible] in all cases [illegible] (temporary officers) even though [illegible] consists [illegible] of [illegible] service.

3. This [illegible] will have full retrospective effect [illegible] of sick pay [illegible] cases *at the [illegible]* these cases [illegible] Admiralty approval under Article [illegible] Regulations [illegible]

4. The attention [illegible] should be drawn [illegible]

(A.F.O. 5215/44, *Section 45, paragraph 1, is cancelled.*)

2803.—Dental Standard on Entry—Regular Engagements

(M.D.G. 832/47.—8 Aug. 1947.)

With reference to Recruiting Instructions, B.R. 689, Chapter III, paragraph 3e (ix) which lays down the dental defects which disqualify a candidate for entry into the Royal Navy under regular engagements, the attention of examining officers is drawn to the following clause:—

> The number of missing and irreparable teeth given above is intended as a general guide but the rule is not to be too rigidly enforced in the case of candidates who are in every other respect fit and suitable, if the remaining teeth are in good condition, afford an efficient area of mastication and are likely to remain so for at least 12 years.

2. In cases where any doubt exists as to the dental fitness or otherwise of a candidate for entry, the matter should be referred to the Medical Director General.

(*B.R. 689 Chapter III.*)

2820.—Officers admitted to and surveyed at R.N. Hospitals—Reports on M. 123 and M. 123b

(M.D.G. 24950/47.—8 Aug. 1947.)

Forms M.123 and M.123b rendered, *if necessary*, as a result of findings at the medical examination required by A.F.O. 2554/47, II (iii) are to be clearly marked in red ink at the top right hand corner—"A.F.O. 2554/47."

(*A.F.O. 2554/47.*)

*2983.—King Edward VII Convalescent Home for Officers—Admission of Women Officer Patients

(C.W./M.D.G. 21771/47.—22 Aug. 1947.)

It has been decided that a limited number of serving women officer patients may be admitted to King Edward VII Convalescent Home, East Cowes, Isle of Wight. Consequently W.R.N.S. Officers and members of the Q.A.R.N.N.S. are now eligible for the benefits of Osborne House under the conditions described in A.F.O. 6428/46.

(*A.F.O. 6428/46.*)

2985.—Dental Standards of Entry—Temporary Partial Suspension

(N. 2722/47.—21 Aug. 1947.)

Dental standards of entry have been temporarily suspended for candidates for Regular Engagements (S.S. or C.S.) of 17 years and above who obtain a score of over 50 in Selection Test R.

2. Existing dental standards as shown in Recruiting Instructions, B.R. 689 will continue to apply to boys, to candidates below the age of 17 years and to those candidates of 17 years and above who obtain a selection test of 50 or below.

(*A.F.O. 1925/38 is cancelled.*)

3069.—Dental Officers Annual Practising Certificates

(M.D.G. 25723/47.—29 Aug. 1947.)

The temporary provision whereby serving dental officers were exempt from obtaining an Annual Practising Certificate from the Dental Board of the United Kingdom during the period of the National Emergency has been cancelled.

[illegible] 27th [illegible] 1921 [illegible] A.F.O. Article 1438 [illegible] the 31st December [illegible]

([illegible] 1438.)

([illegible] 528.)

3101.—V.A.D. Officers [illegible] in the Supply [illegible]

([illegible] 1947.)

With reference [illegible] officers shall be entitled [illegible] the supply [illegible] to the supply [illegible]

[illegible]

V.A.D. [illegible]

[illegible]

V.A.D. [illegible]

[illegible]

3103.—W.R.N.S.—Inoculation and Vaccination

(N. 7698/47.—29 Aug. 1947.)

The [illegible] vaccination and inoculation contained [illegible] Article 1417 [illegible] A.F.Os. are applicable to W.R.N.S. personnel.

2. [illegible] entry or re-enrolment into the W.R.N.S. [illegible] vaccination [illegible] is not to be allowed to engage or re-engage [illegible]

3. The [illegible] ratings who refuse vaccination [illegible] with K.R. and A.I. Article 1417 paragraph [illegible]

(K.R. and A.I. Article 1417.)

3153.—Mass Radiography for the Detection of Tuberculosis—Arrangements for Second Examinations of Civilian Staff

(C.E. 224174[illegible].—29 Aug. 1947.)

Attention is drawn to A.F.O. 5960/44 which outlined in full the scheme for examination of civilian staff by mass radiography for the detection of tuberculosis.

2. So far as is possible arrangements have already been made under the scheme for a first examination of Admiralty staff employed in outport establishments but the number of units available throughout the country is still limited and there remain some establishments which are not yet within reasonable travelling distance of a unit. The position is kept constantly under review and whenever a new unit is opened establishments within its working orbit will be informed from Headquarters.

4. [illegible] nt from [illegible] it is desirable that [illegible] suggested where [illegible] to cover second [illegible]

5. [illegible] Headquarters [illegible] Charge [illegible] from the [illegible] nation of [illegible]

[illegible] the sch[illegible] the free sp[illegible] a part [illegible]

6. [illegible] have been [illegible] will be [illegible]

7. [illegible] through [illegible] Secretar[illegible]

[illegible] 5960/44.)

3257.—Medical and Dental Officers R.N.V.R.—Grant of Short Service Engagements

(C.W. 62578/46.—12 Sep. 1947.)

Consequent on the decision to discontinue the grant of Extended Service engagements after the 30th June 1947, the following conditions under which R.N.V.R. medical and dental officers at present serving may after that date be accepted for further service are promulgated for information:—

(1) The engagement will be for Short Service for a period of four years.

(2) Officers who satisfactorily complete the full period of four years will receive a gratuity as follows:—

Medical officers £600 } free of tax
Dental officers £500 }

(3) Officers who fail to complete the full period of four years as a result of invaliding or for causes not due to their own default will be eligible for gratuities on a proportionate basis.

(4) Officers accepted will be transferred to the Royal Navy but will be allowed to count former R.N.V.R. service for pay, seniority and promotion; they will also be eligible for an antedate of seniority in respect of civil hospital time up to a maximum of 12 months with effect from the date of the commencement of the Short Service engagement.

(5) Officers leaving the service on the expiration of the Short Service engagement will be placed on the Emergency List and will be liable for service in war or emergency during the subsequent four years.

(6) The date of the commencement of the Short Service will be at Admiralty discretion and will normally be the date of acceptance of the application.

2. Applications are invited from R.N.V.R. medical and dental officers with over six months' service. Each application should be forwarded with the recommendation of the

Commanding Officer together with a medical certificate [illegible] fit for general service

3 Attention is drawn to the fact that such officers will [illegible] the permanent list of R N medical or dental officers [illegible] Short Service engagement

(A F Os 5423 46 and 1341 46

(A F Os 1846/46 3831/46 838 47 and 1159 4[illegible])

3306 —Trincomalee—Address of Royal Naval Hospital

(M 4462/47 —12 Sep 1947)

The Combined Services Hospital Trincomalee formerly known as the Royal Naval Auxiliary Hospital has been renamed as follows —

Royal Naval Hospital Trincomalee

3309 —Form M 9—Report on Post-Mortem Examination—Introduction

(M D G 51948 45 —12 Sep 1947)

Form M 9—Report on Post Mortem Examination has been introduced and [illegible] used in future to record all post mortem examinations at R N hospitals and [illegible] establishments

2 Demands for these forms should be made as follows —

At Home —

From the Superintending Naval Store Officer
R N Store Depot
Elveden Road
Park Royal N W 10

Abroad —

From the Distributing Authority

*3337 —Life Assurance Scheme—Position of Permanent Members of the Q A R N N S

(C W D N A 27259 47 —19 Sep 1947)

Permanent members of the Queen Alexandra's Royal Naval Nursing Service [illegible] effect life assurance under the scheme sponsored by the Admiralty [illegible] Queen Alexandra's Royal Naval Nursing Service [illegible] policies under this scheme as [illegible] officers [illegible] the service

2 It is understood that the standard types of policies shown in A F O [illegible] would be suitable for permanent members of the Q A R N N S [illegible] types of policies can be obtained [illegible] A F O 210[illegible]

(A F O 2402 47)

3341 —Instructional Dental Films

(M D G [illegible] 19 Sep 1947)

Lists are given below of available instructional dental films [illegible] and their distribution. Applications [illegible] appropriate library in accordance with B R [illegible]

2 Full use should be made of these films [illegible] instruction

[illegible]

[illegible]

Ref No	[illegible]	[illegible]	Running Time	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] imaginary [illegible] in R A F [illegible]
[illegible]	Oral Hygiene	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
Command [illegible]		
Chatham	[illegible]	[illegible]
Portsmouth	[illegible]	[illegible]
Plymouth	[illegible]	[illegible]
Rosyth	[illegible]	[illegible]
Malta	[illegible]	[illegible]
Hong Kong	[illegible]	[illegible]
Trincomalee	[illegible]	[illegible]
Instruction [illegible]		
Bermuda	[illegible]	[illegible]
Simonstown	[illegible]	[illegible]
Singapore	[illegible]	[illegible]

([illegible] 1271.)

([illegible] 5466/43 [illegible])

3347.—Medical Attendance on Ratings while on Leave—Revised [illegible] Civilian Medical Practitioners

(C.F. 11276/47.—19 Sep. 1947.)

The scale of [illegible] authorised by K.R. and A.I., Art. 1440, [illegible] practitioners attending naval ratings taken ill while on leave [illegible] with effect from 1st July, 1947:—

(i) Visit by [illegible] [illegible]

(ii) (a) Visit [illegible] [illegible]

Day [illegible]

Night (8 p.m. to 8 a.m.) [illegible]

(b) Allowance [illegible] [illegible] is visited [illegible]

(iii) [illegible] and at 7 days intervals thereafter [illegible] doctor's care [illegible]

The fees [illegible] (i) and (ii) (a) [illegible] total maximum of [illegible] per day.

2. The fees are inclusive [illegible] stances [illegible] dressings [illegible] ing Officer [illegible] and [illegible] of the [illegible] should [illegible] [illegible]

([illegible] 1440.)

([illegible] 3603/45 [illegible])

3348.—Compulsory Treatment of Venereal Disease—Defence Regulation [illegible]

(M.D.G. [illegible]—19 Sep. 194[illegible])

Defence Regulation 33B (S.R. and O. 2277) [illegible] venereal disease [illegible]

2. The main purpose of the Regulation [illegible]

[illegible]

[illegible] in the United Kingdom is [illegible]

[illegible] R.N., Naval Medical Officer [illegible]
[illegible] R.N., Naval Medical Officer [illegible]
[illegible] R.N., Naval Medical Officer [illegible]
[illegible] R.N., Naval Medical [illegible]

7. [illegible] for the [illegible]

8. [illegible]

(K.R. 775(1))

(A.F.O. 1136/47 is cancelled.)

3411.—Food Rationing—General Instructions

(V. [illegible]/46.—26 Sep. 1947.)

SECTION X.—HOSPITALS

[illegible] R.N. auxiliary hospitals should normally [illegible] supplies [illegible] as necessary [illegible] certain rationed [illegible] instructions [illegible] Service hospitals [illegible] institutions and [illegible] any Service hospital [illegible] application [illegible] the purpose.

2. [illegible] Ministry of Food [illegible]

3. [illegible]

4. [illegible] patients [illegible]

5. [illegible] treatment [illegible]

(a) [illegible]

(b) [illegible] with [illegible]

(c) Bacillary [illegible]

(d) Typhoid [illegible]

Persons entitled [illegible] egg per allocation [illegible] from the Ministry [illegible] number of patients [illegible] adjusted accordingly. [illegible] have not been met [illegible]

6. [illegible]—Hospitals [illegible] authorised to obtain [illegible]

[illegible]

[illegible] Officer [illegible] which [illegible] Ministry [illegible]

[illegible]

[illegible] Royal Medical [illegible]

[illegible]

[illegible] Records—Royal Marines, Other Ranks

(M.D.G. [illegible]/47 [illegible] 1947)

[illegible]

[illegible] H.M.S. [illegible]

([illegible] 787/47 and 2747/47.)

3487.—Acute Poliomyelitis (Infantile Paralysis)—Procedure when Civilian Staff are Involved as Contacts

(C.E. 50003/47.—26 Sep. 1947.)

The attention of all civilian non-industrial and industrial staff should be drawn to the fact that acute poliomyelitis (also known as infantile paralysis) is classified as a notifiable infectious disease.

2. Absence from duty is not necessary in the case of contact with a person suffering from this disease unless the local Medical Officer of Health [illegible]. Such a contact should [illegible] the [illegible] immediately and report the fact to the medical officer of the establishment [illegible] his other superior officer. The contact should be required to [illegible] unless the local Medical Officer of Health [illegible] the medical officer of the establishment [illegible] should be sought by telephone where there are any special considerations.

[*Home Dockyard Regulations, Article 302, and Office Instructions* [illegible] *Establishments, Article 68*]

— —

NOTES BY OUR WARDROOM CORRESPONDENTS

HOME STATION

Here are the Pathologists going. [illegible] medical officers. Most of us are still [illegible] examination of bodies and a systematic examination routine which includes only the

[illegible]

[illegible]

HONG KONG

On 24th September 1945 [illegible] history of the [illegible] Naval Medical [illegible] of the Royal Naval Auxiliary Hospital [illegible] *Empire* [illegible] Hong Kong [illegible] Royal Naval Hospital [illegible] the Royal Naval Hospital [illegible] was due in no small measure [illegible] *Tender* and by the Royal M[illegible]

The old hospital at W[illegible] of war was found [illegible] War Memorial Hospital [illegible] unoccupied hospital building [illegible] recently been [illegible] Hong Kong [illegible] will be completed by [illegible]

In October 1945 the [illegible] [illegible] At night the [illegible] [illegible] The average [illegible]

[illegible]

[illegible] higher [illegible] spe[illegible] important [illegible] times [illegible] certain [illegible] the re[illegible] extensive [illegible]

[illegible] ably [illegible] of all [illegible] this [illegible] report [illegible]

[illegible] hospitals has [illegible] more [illegible]

[illegible] which the [illegible] head in as [illegible] attacks [illegible] the war Hong [illegible] reported [illegible] can [illegible] newspapers in [illegible] than Hong Kong [illegible]

INTER-PORT HOSPITALS' CRICKET COMPETITION, 1947

This triangular tournament was resumed again after being in abeyance since 1939 and was played at Haslar (by kind permission of Surgeon Rear Admiral J. A. O'Flynn, C.B.) on 8th and 9th July, 1947.

The draw gave Chatham the bye. Haslar batted first against Plymouth and knocked up 157, to which Plymouth could muster only 67 in reply.

On the next day a very confident Chatham took first knock against Haslar but they were all out for 77. Haslar seemed to have the match in the bag when the score stood at 70 for 6, but three wickets then fell at the same total. The excitement was intense when the last pair added six runs, but with the total at 76 the last wicket fell and Chatham were the winners by one run.

After the match there was a dinner party in the gymnasium of the Sick Berth Staff Mess where many old friendships were renewed and fresh ones made. After numerous speeches and toasts the party adjourned to the Errol Hall where a thoroughly enjoyable dance rounded off a first class cricket festival.

NURSING OFFICERS' TENNIS CHAMPIONSHIP

The Championship was inaugurated in 1937, when the presentation of a most handsome silver cup was made by Miss Bertha M. Martin, *R.R.C.*, Q.A.R.N.N.S., Miss Daisy Martin, *C.B.E.*, *R.R.C.*, Q.A.I.M.N.S., and Miss Katherine Watt, *R.R.C.*, P.M.R.A.F.N.S. (later Dame Katherine), Matrons-in-Chief at that time.

The cup, engraved with the badges of the three Nursing Services, was to be played for annually, and to be held by the winning service for a year, the names of the winning pair being recorded on the cup.

The [illegible] year 193[illegible] the Championship was played at the Royal Naval Hospital Chatham when the Naval Sisters took the cup, the winning pair being Miss K. M. Cooper and Miss S. Kirkpatrick. The same pair were the winners in the following year when play took place at the Royal Air Force Hospital at Uxbridge.

In 1939 the Championship was played off at the Royal Victoria Hospital Netley, when the cup was taken from the Naval Sisters by the Army Sisters, the winning team being Miss Steele and Miss Kempson. It was retained by them in safe custody during the war and until this year when it was decided to resume play.

Permission was granted for the cup to be played for at the Medical Mess courts at the Royal Naval Hospital Haslar on 9th August 1947 and on a perfect afternoon, after a very good fight the Royal Air Force Sisters, Miss Ashworth and Miss B. M. Buchanan walked off with the cup.

Among the onlookers on this occasion were Lord Fraser, Commander-in-Chief Portsmouth Command, Air Marshal Sir Andrew and Lady Grant and Surgeon Rear Admiral and Mrs. J. A. O'Flynn. The cup was handed to the winners by Dame Matilda Goodrich, late Matron-in-Chief Q.A.R.N.N.S.

Better luck to the Naval Sisters next time!

OBITUARY

We regret to announce the death of Surgeon Captain W. E. EDWARDS, R.N. at [illegible] on 18th September 1947.

Born in 1877 Surgeon Captain Edwards [illegible] 1901. He entered the Royal Navy as Surgeon in June 1902 and was promoted to Staff Surgeon in 1910 and to Surgeon Commander in 1918. He [illegible] the [illegible] and [illegible] during the 1914-1918 war and was placed on the Retired List in April 1927.

We regret to announce the death of Surgeon [illegible] R.N. (Rtd.) on 3rd August 1947 at [illegible] W. [illegible] B[illegible]

[illegible] Hospital [illegible] 1917 [illegible] H.M.S. [illegible] Hospital [illegible] the Service [illegible] Surgeon [illegible]

[illegible] the Navy [illegible] the Naval [illegible] in the Fifth

He was promoted to Surgeon [illegible] 1913 and was placed on the Retired List [illegible] Naval [illegible]

HONOURS AND AWARDS

[illegible] (O.B.E.) [illegible]

Surgeon Vice Admiral Sir Sheldon Dudley K.C.B., O.B.E., F.R.S.

[illegible]

Surgeon [illegible] J. C. S[illegible] M.B., [illegible]

[illegible]

[illegible]

DEGREES

[illegible] Royal College [illegible]

[illegible] J. W. [illegible] R.N.

TRANSFERS TO THE PERMANENT LIST

Lieutenant J. A. C. Davis [illegible] transferred to the Permanent List 1st [illegible]

[illegible] Surgeon Lieutenant Commander (D) [illegible] H. Hodgson [illegible] 1st June 1947.

[illegible] R. H. [illegible] transferred to the Permanent List [illegible]

[illegible] N. M. [illegible] transferred to the Permanent List 23rd June [illegible]

[illegible] Lieutenant Commander J. [illegible] transferred to the Permanent List [illegible] 194[illegible]

[illegible] A. J. [illegible] transferred to the Permanent List [illegible]

[illegible] Surgeon Lieutenant S. D. [illegible] transferred to the Permanent List [illegible] 1947.

[illegible] J. S. [illegible] transferred to the Permanent List [illegible]

TRANSFERS TO SHORT SERVICE COMMISSION

Lieutenant A. M. [illegible] granted [illegible] years Short Service Commission [illegible] June 1947.

Lieutenant J. D. [illegible] granted [illegible] years Short Service Commission [illegible] June 194[illegible]

[illegible] J. C. Ryan granted [illegible] Short Service Commission [illegible] June 194[illegible]

[illegible] Short Service Commission [illegible] June 1947.

[illegible] H. [illegible] granted [illegible] years Short Service Commission [illegible] June 1947.

[illegible] granted [illegible] Short Service Commission [illegible] June 194[illegible]

[illegible] Short Service Commission [illegible] August 1947.

[illegible] granted [illegible] years Short Service Commission [illegible] 194[illegible]

[illegible] C. J. [illegible] granted [illegible] Short Service [illegible] August 1947.

PROMOTIONS

[illegible] A. J. Walsh promoted [illegible] 26th June 194[illegible]

[illegible] J. M. Fitzpatrick promoted to Acting [illegible] July 1947.

[illegible] Commander W. B. C. Watson promoted to Acting [illegible] July 1947.

[illegible] Lieutenant [illegible] J. Wh[illegible] [illegible] Service Commission [illegible] June 194[illegible]

[illegible]

[illegible] 1947.

RETIREMENTS

Surgeon [illegible] D[illegible] placed on R[illegible] 15th A[illegible] 19[illegible]

Surgeon [illegible] R[illegible] 8th Se[illegible]

Surgeon [illegible] H[illegible] R[illegible] September 19[illegible]

Surgeon [illegible] M[illegible] R[illegible] September 19[illegible]

Surgeon Captain [illegible] 8th N[illegible]

ENTERED FOR SHORT SERVICE COMMISSIONS

H. Walter, M.R.C.S., L.R.C.P., entered as Acting Surgeon Lieutenant for Short Service Commission 6th June 1947.

J. M. Guthrie, L.D.S. R.C.S., entered as Acting Surgeon Lieutenant for Short Service Commission 20th June 1947.

D. J. Crowley, M.B., B.Ch., entered as Acting Surgeon Lieutenant for Short Service Commission 4th July 1947.

A. H. J. Whitehouse, L.M.S.S.A., entered as Acting Surgeon Lieutenant for Short Service Commission 11th July 1947.

R. W. Pook, [illegible] entered as Acting Surgeon Lieutenant for Short Service Commission 18th July 1947.

O. P. Jordan, M.B., B.Ch., entered as Acting Surgeon Lieutenant for Short Service Commission 12th September 1947.

J. M. Atherton, M.B., B.S., entered as Acting Surgeon Lieutenant for Short Service Commission 26th September 1947.

H. S. Smith, L.D.S., entered as Acting Surgeon Lieutenant for Short Service Commission 26th September 1947.

I. S. Ferguson, L.D.S., entered as Acting Surgeon Lieutenant for Short Service Commission 26th September 1947.

C. W. Henshaw, L.D.S., entered as Acting Surgeon Lieutenant for Short Service Commission 26th September 1947.

M. J. McCrann, M.B., B.Ch., entered as Acting Surgeon Lieutenant for Short Service Commission 28th September 1947.

W. B. Walker, L.R.C.P., L.R.C.S., L.R.F.P.S., entered as Acting Surgeon Lieutenant for Short Service Commission 10th October 1947.

K. G. Jarrett, L.D.S., entered as Acting Surgeon Lieutenant for Short Service Commission 24th October 1947.

ROYAL NAVAL VOLUNTEER RESERVE

EXTENDED SERVICE COMMISSIONS

Surgeon Lieutenant W. Stephen granted five years' Extended Service Commission from 29th June 1946.

Surgeon Lieutenant J. P. Griffiths granted four years' Extended Service Commission from 4th November 1946.

Surgeon Lieutenant M. J. G. Davies granted five years' Extended Service Commission from 7th November 1946.

Acting Interim Surgeon Lieutenant Commander W. A. Burnett granted [illegible] Extended Service Commission from 21st April 1947.

[illegible]

PROMOTIONS

[illegible] W. A. B[illegible] [illegible] 1947.

RETIREMENTS

[illegible] *O.B.E.* [illegible] 1947.

[illegible] 1947.

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

PROMOTIONS

Miss G. H. Franklin, *M.B.E.*, *R.R.C.*, Senior Sister, promoted to Matron-in-Chief vice Miss Gordon, 14th July, 1947.

Miss M. E. Cranston, *O.B.E.*, *R.R.C.*, Nursing Sister, promoted to Senior Sister 14th July, 1947.

RETIREMENT

Miss Matilda C. [illegible], *O.B.E.*, *R.R.C.*, Matron-in-Chief, placed on the Retired List [illegible] 1947.

WARDMASTER OFFICERS

TRANSFER TO THE PERMANENT LIST

[illegible] Wardmaster W. S. W[illegible] transferred to the Permanent List 3rd June, 1947.

PROMOTION

[illegible] Wardmaster B. W. [illegible], *M.B.E.*, promoted to Wardmaster [illegible] June, 1947.

RETIREMENTS

[illegible] Acting Commissioned Wardmaster C. E. Hart placed on the Retired List [illegible] 14th August, 1947.

[illegible] Commissioned Wardmaster C. J. Brown released 1st September [illegible]

[illegible] Commander B. J. [illegible], *M.B.E.*, R.N., released 25th [illegible]

Wardmaster [illegible] *M.B.E.*, *D.S.M.*, R.N., released 25th September [illegible] (Wardmaster Lieutenant-Commander).

[illegible] *M.B.E.*, R.N., released 25th September, 1946 [illegible] (Wardmaster Lieutenant-Commander).

Wardmaster Lieutenant [illegible] *M.B.E.*, released 24th October, 1947.

Temporary Warrant Wardmaster C. T. W. [illegible] released, date to be reported.

Temporary Warrant Wardmaster L. S. [illegible] released, date to be reported.

Temporary Warrant Wardmaster H. E. [illegible] released, date to be reported.

Notices.

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Notice

[illegible] is still [illegible] of news and [illegible] ships and [illegible]

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